Information Technology in Missouri

RESEARCH AND PLANNING
Missouri Department of Economic Development

Information Technology in Missouri

Preface

American futurist Herman Kahn once said that the computer revolution is the most advertised revolution in world history, but that we were probably still underestimating its impact.

Along with the rest of the nation, Missouri has seen the computer revolution blossom during the past two decades. Now our state is witnessing the convergence of computing and communications into one industry, known as information technology, or IT. Once again, we are probably underestimating the impact of this new industrial sector.

As the Information Age continues to gain momentum, the demand for qualified workers and adequate telecommunications infrastructure continues to increase. Author Peter Drucker has pointed out that the idea of information technology is not an entirely new concept. For instance, the British built a communications system in colonial India in which information technology was a quill pen and telecommunications was a barefoot runner.

In its current usage, information technology is a term that is often used by government and industry to describe a series of processes, products and services related to computers, software, telecommunications and the Internet.

A few years ago, seeking to strategically focus its economic development efforts, the Missouri Department of Economic Development studied several industry sectors to see if Missouri could use its particular assets and resources to attract new businesses strengthen current businesses and create jobs. The department chose to target information technology as one of its top three sectors because of its already developing industrial base in the field.

In terms of economic development, the IT sector generates high-paying, high-technology jobs. Because of its pervasiveness, the IT industry also works as a magnet for companies in other sectors that desire to utilize its tools and talent.

This report analyzes the IT sector, as well as its various subsectors, to determine its impact on Missouri's economy. As with recent discoveries in genetics, we may not yet know the ramifications of each technological change. Regardless of the changes that will come, Missouri's economy must either play a central role as the industry evolves or step aside and allow others to benefit from the inevitable economic growth that will result.

Mark Twain once said that a Mississippi riverboat pilot had to "learn more than any one man ought to be allowed to know" and that he must "learn it all over again in a different way every 24 hours." His words seem appropriate to the Missouri of today, with an economy increasingly driven by new information and the evermore sophisticated technologies that carry it. Missouri may not understand the course of the river that takes us into the future, but it needs to be on the boat.

Information Technology in Missouri

Executive Summary

- ***Information Technology (IT)*** employment and wages in Missouri are concentrated in the metropolitan areas of the state, however, it is not an entirely urban characteristic.

- ***IT Software*** employment is concentrated in St. Louis County, Jefferson City, Wayne County, and Lincoln County; and to a lesser degree in Springfield.

- ***IT Services*** employment is concentrated in St. Louis County, northern Kansas City, Barry County, Maries County, and Polk County; and to a lesser degree in Kansas City and Bowling Green.

- ***IT Telecommunication Services*** employment is concentrated in St. Louis City, Kansas City, Cape Girardeau, Princeton, Cameron, and Knox County; and to a lesser degree in St. Charles and Hannibal.

- In 1999, there were 63,820 IT sector jobs in Missouri. This direct employment created an additional 121,188 ancillary jobs in the Missouri economy – for a total impact of 185,008 jobs statewide.

- In 1999, the IT sector directly accounted for 4.54% of total GSP in Missouri ($6.93 billion). Indirect and induced economic effects attributable to the IT sector accounted for 3.68% of GSP ($5.63 billion). Taken together, the IT sector directly and indirectly accounted for 8.23% of total GSP in Missouri ($12.57 billion).

- The creation of 100 jobs in the IT sector would produce $5,066,327 in wages statewide, resulting in an average wage per job of $50,663. This direct impact would also create an additional 190 ancillary jobs and $4,896,179 in wages, for a total impact of 290 jobs and $9,962,506 in wages across Missouri.

- Given that the IT sector creates high wage jobs and has a significant positive impact on other economic sectors, the state should attempt to retain and recruit IT firms to Missouri.

Information Technology in Missouri

I. Overview

In its current usage, information technology (IT) is a term that is often used by government and industry to describe a series of processes, products and services related to computers, software, telecommunications and the Internet. The value of IT lies in its capacity to store, analyze and communicate information instantly, anywhere, at a negligible cost. As Brad DeLong of the University of California at Berkeley puts it, "IT and the Internet amplify brain power in the same way that the technologies of the Industrial Revolution amplified muscle power."[1]

Many economists and politicians state that IT is responsible for the New Economy. While it is still too early to evaluate that statement, it is safe to claim that IT is certainly one of the key factors behind America's current productivity. In fact, Oliner and Sichel note that almost half of the increase in productivity during the 1990s was attributable to capital investments in IT firms[1].

However, many economists claim that IT is nothing more than "insignificant toys", not the economic and technological revolution it is claimed to be. They compare IT to the "Victorian Internet" – the telegraph. Like IT, the telegraph also brought a large drop in communications costs and increased flow of information through the economy, but it did not turn conventional economic wisdom on its head. What is clear, however, is that IT is revolutionizing the way we communicate, work, shop and play.

IT is important in that: (1) it is pervasive, increasing efficiency and productivity in everything a firm does across all economic sectors; (2) it increases access to information, thereby allowing markets to work more efficiently by making transactions more transparent; (3) it is truly global, allowing firms to communicate and send information at almost no cost from anywhere in the world, thereby globalizing production and capital markets; and (4) it speeds up innovation by reducing the amount of time to process data and design new products. In this report, the IT sector, as well as its various subsectors, are analyzed to determine its impact on Missouri's economy.

This report analyzes the IT sector, as well as its various subsectors, to determine its impact on Missouri's economy. As with recent discoveries in genetics, we may not yet know the ramifications of each technological change. Regardless of the changes that will come, Missouri's economy must either play a central role as the industry evolves or step aside and allow others to benefit from the inevitable economic growth that will result.

[1] Survey: The New Economy. *The Economist*. 23 September 2000.

II. Methodology

The Information Technology (IT) sector in Missouri is analyzed using economic base statistics and input-output models. The IT sector was defined using a classification scheme developed at George Mason University[2]. According to this definition, IT firms employ above average numbers of scientific and technical personnel, and possess above average research and development budgets.

From this information, Standard Industry Classifications (SICs) were identified as comprising the IT sector, and were disaggregated into various IT subsectors. These industries include communications firms (except broadcasting), software firms, data and information processing firms, computer facilities, and computer maintenance firms. Refer to the Appendix for a full list of SICs.

Specialization ratios (SRs), also known as location quotients, are used to describe the dispersion of the IT sector across Missouri. SRs measure a county's employment concentration in a given economic sector relative to the state average. SRs are useful because they indicate areas of potential economic growth within the county, or a county's comparative advantage in a given sector. Comparing these ratios over time gives an indication of the relative strengths and weaknesses of the IT sector.

SRs greater than 1.0 indicate that the county is relatively more specialized in an industry relative to the state as a whole; or that the county has a comparative advantage in that industry. SRs less than 1.0 indicate that the county is less specialized in an industry relative to the state as a whole, which may indicate an area for potential growth; or that the county does not have a comparative advantage in that industry.

It is important to note that SRs measure the proportion of sector employment relative to the state average, and ***not*** the total number of jobs. Therefore, although St. Louis may have the largest number of information technology employees, it accounts for only a small percentage of total employment – leading to a small SR. It is also important to note that the following SRs are normalized to the Missouri mean. In general, SRs are most informative when normalized to the national mean. However, national data was not available at this level of sectoral detail.

[2] Stough et al. 1998. *Technology in Virginia's Regions.* Center for Innovative Technologies.

The formula for a SR is given below:

$$SR_{sector} = \frac{\left(\frac{SECTOR\_EMPLOYMENT_{county}}{TOTAL\_EMPLOYMENT_{county}}\right)}{\left(\frac{SECTOR\_EMPLOYMENT_{state}}{TOTAL\_EMPLOYMENT_{state}}\right)}$$

IMPLAN is utilized to estimate the economic impacts of information technology in Missouri. IMPLAN is a well-established input-output model that examines the economic relationships among businesses, and between businesses and consumers. The model estimates how changes in one or several economic sectors affects an entire economy.

IMPLAN derives three types of economic effects that permit one to assess the impact of the information technology sector: *direct effects* are economic impacts directly attributable to IT; *indirect effects* are business-to-business economic impacts; and *induced effects* are business-to-business and business-to-consumer economic impacts (spending of discretionary income by employees).

While IMPLAN is a powerful tool in examining economic changes at the local level, it is limited in that it cannot predict long-term effects. It only offers a snapshot of an area's economy at one point in time, and is therefore relatively static.

Lastly, the list of IT companies in Missouri was developed using information from Dun and Bradstreet.

III. Information Technology in Missouri

A. Total IT Sector

The Information Technology (IT) sector includes telephone communications; telegraph and other messaging communications; cable and other pay television stations; other communication services; computer programming services; prepackaged software; computer integrated systems design; computer and data processing; information retrieval services; computer facilities management; computer rental and leasing; computer maintenance and repair; and other computer services.

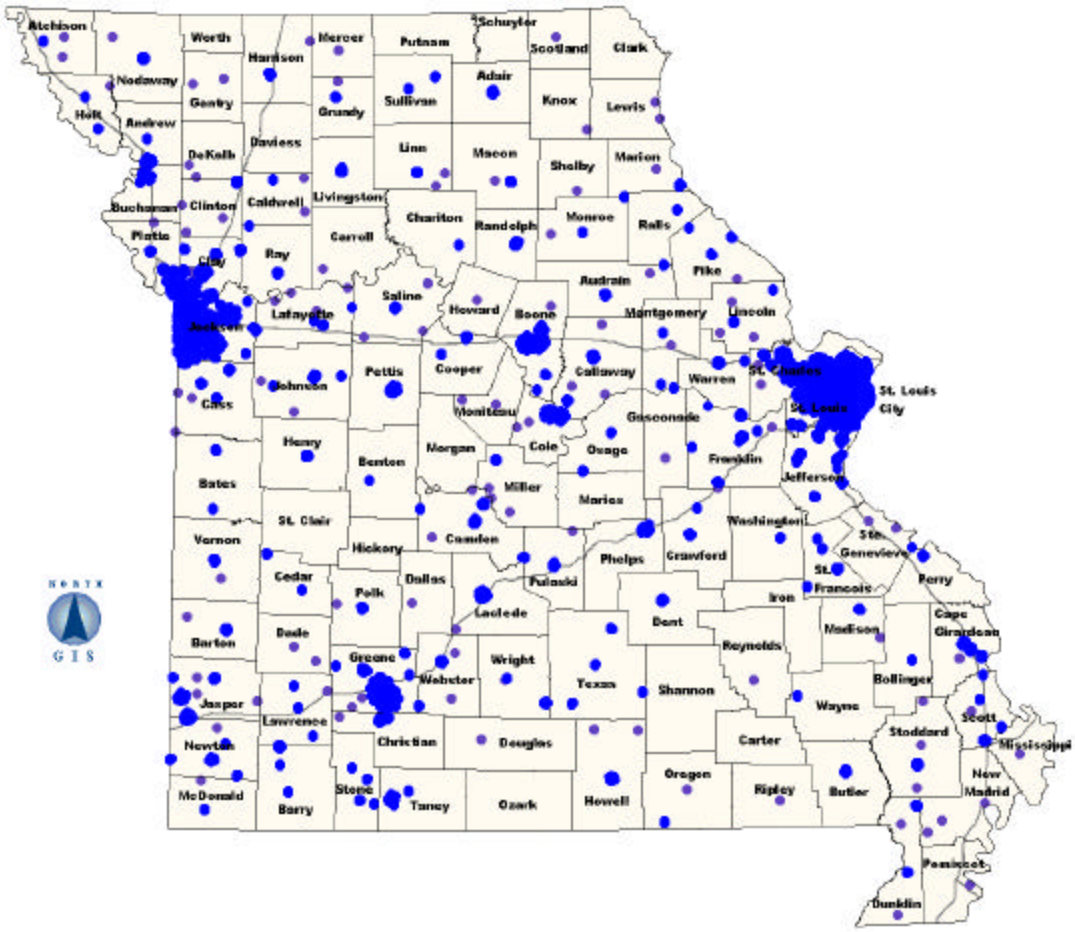
Missouri has 11 companies with more than 1,000 employees in the IT sector. The majority of them (N=6) are involved in telephone communications. Two are involved in data processing, one in software development, and one with systems integration. Refer to Table 1 and the map below.

Table 1
Largest Employers in the Information Technology Sector in Missouri, 1999

Company	Town	SIC Description	Employment
A G Edwards & Sons Inc	Saint Louis	Data processing service	2,500 to 4,999
AT&T Corp	Kansas City	Local and long distance telephone communications	2,500 to 4,999
Maritz Performance Imprv Co	Fenton	Data communication services	2,500 to 4,999
Trans World Airlines Inc	Kansas City	Long distance telephone communications	2,500 to 4,999
Cerner Corporation	Kansas City	Business oriented computer software	1,000 to 2,499
GTE Midwest Incorporated	Wentzville	Telephone communication, except radio	1,000 to 2,499
MCI Worldcom Network Services	Springfield	Telephone communication, except radio	1,000 to 2,499
Southwestern Bell Telephone	Saint Louis	Local telephone communications	1,000 to 2,499
SPRINT PCS	Kansas City	Telephone communication, except radio	1,000 to 2,499
St Johns Mercy Medical Center	Saint Louis	Data processing service	1,000 to 2,499
The Boeing Company	Hazelwood	Systems integration services	1,000 to 2,499
The Boeing Company	Saint Louis	Systems integration services	1,000 to 2,499

Source: Dun and Bradstreet

Information Technology Sector
Location of Firms



Includes telephone communications; telegraph and other message communications; cable and other pay television stations; other communication servies; computer programming services; pre-packaged software; computer integrated systems design; computer and data processing; information retrieval services; computer facilities management; computer rental and leasing; computer maintenance and repair; and other computer services.

Source: Dun and Bradstreet

In 1999, there were 63,820 IT sector jobs in Missouri. This direct employment created an additional 121,188 ancillary jobs in the Missouri economy – for a total impact of 185,008 jobs statewide. Apart from IT employment, the Services and Retail/Wholesale Trade sectors were most positively affected – resulting in 52,213 and 28,883 jobs, respectively. The Mining sector was marginally affected, resulting in only 81 jobs. Refer to Table 2.

Table 2
Information Technology Employment in Missouri, 1999
Assumes 100% Local Impact.

SECTOR	Employment			
	Direct	Indirect	Induced	**TOTAL**
Information Technology	63,820.0	7,206.3	1,086.6	**72,112.9**
Agriculture	0.0	508.4	1,537.3	**2,045.7**
Mining	0.0	28.7	51.7	**80.5**
Construction	0.0	2,969.2	951.0	**3,920.5**
Manufacturing	0.0	2,440.3	3,898.5	**6,338.7**
Transportation & Public Utilities	0.0	1,153.8	3,145.4	**4,299.1**
Retail/Wholesale Trade	0.0	4,690.8	24,192.2	**28,883.0**
Finance, Insur. & Real Estate	0.0	2,164.3	7,514.8	**9,679.0**
Services	0.0	19,417.3	32,795.5	**52,212.8**
Government	0.0	323.9	4,126.8	**4,450.7**
Other	0.0	0.0	985.8	**985.8**
TOTAL	**63,820.0**	**40,902.9**	**80,285.3**	**185,008.3**

Source: ES202, IMPLAN

In terms of Gross State Product (GSP) in 1999, the IT sector directly accounted for 4.54% of total GSP in Missouri ($6.93 billion). Indirect and induced economic effects attributable to the IT sector accounted for 3.68% of GSP ($5.63 billion). Taken together, in 1999 the IT sector directly and indirectly accounted for 8.23% of total GSP in Missouri ($12.57 billion). It is important to note that this model assumes that 100% of industry inputs (labor, materials, etc.) are purchased from Missouri firms. According to IMPLAN estimates, the IT sector purchases only 62.9% of its inputs from firms within the state. Refer to Table 3.

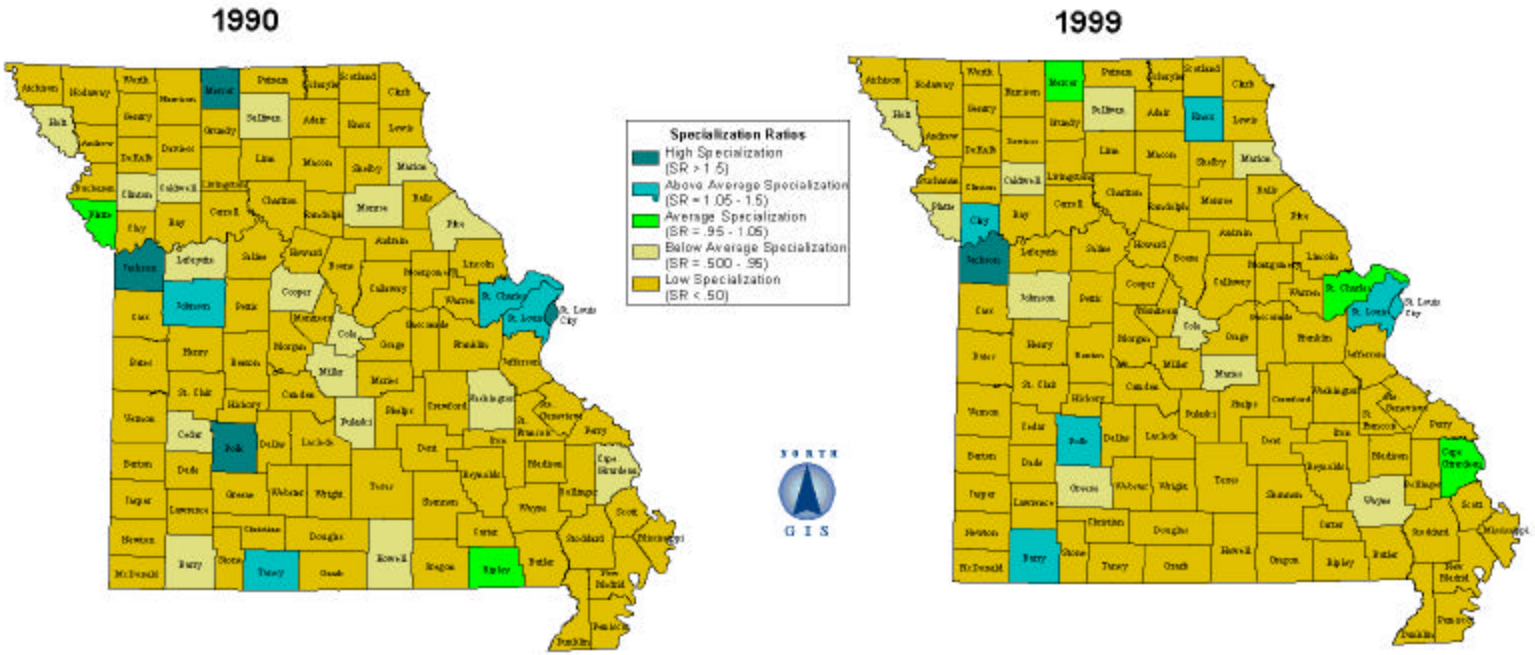
Table 3
Information Technology Gross State Product in Missouri, 1999
Assumes 100% Local Impact.

SECTOR	Percent Gross State Product			
	Direct	Indirect	Induced	TOTAL
Information Technology	100.0	-	-	**-**
Agriculture	-	0.36	1.09	**1.45**
Mining	-	0.52	0.94	**1.47**
Construction	-	1.41	0.45	**1.86**
Manufacturing	-	0.56	0.90	**1.47**
Transportation & Public Utilities	-	0.78	2.12	**2.90**
Retail/Wholesale Trade	-	0.64	3.30	**3.96**
Finance, Insur. & Real Estate	-	1.00	3.50	**4.51**
Services	-	2.07	3.49	**5.57**
Government	-	0.07	0.89	**0.96**
Other	-	0.0	5.17	**5.17**
TOTAL	**4.54**	**1.40**	**2.28**	**8.23**

Source: ES202, IMPLAN

Analysis of SRs indicate that IT employment and wages are concentrated in the core metropolitan areas of St. Louis and Kansas City; and in the rural areas of Barry (Monett), Knox (Hurdland), and Polk (Bolivar) counties. However, in nominal terms employment and wages are concentrated in St. Louis, Kansas City, Columbia/Jefferson City, Springfield, Cape Girardeau, Barry County, Polk County, Joplin, and Hannibal. Recall that SRs measure the proportion of sector employment relative to the state average, and ***not*** the total number of jobs. The four maps below outline employment and wages in the IT sector.

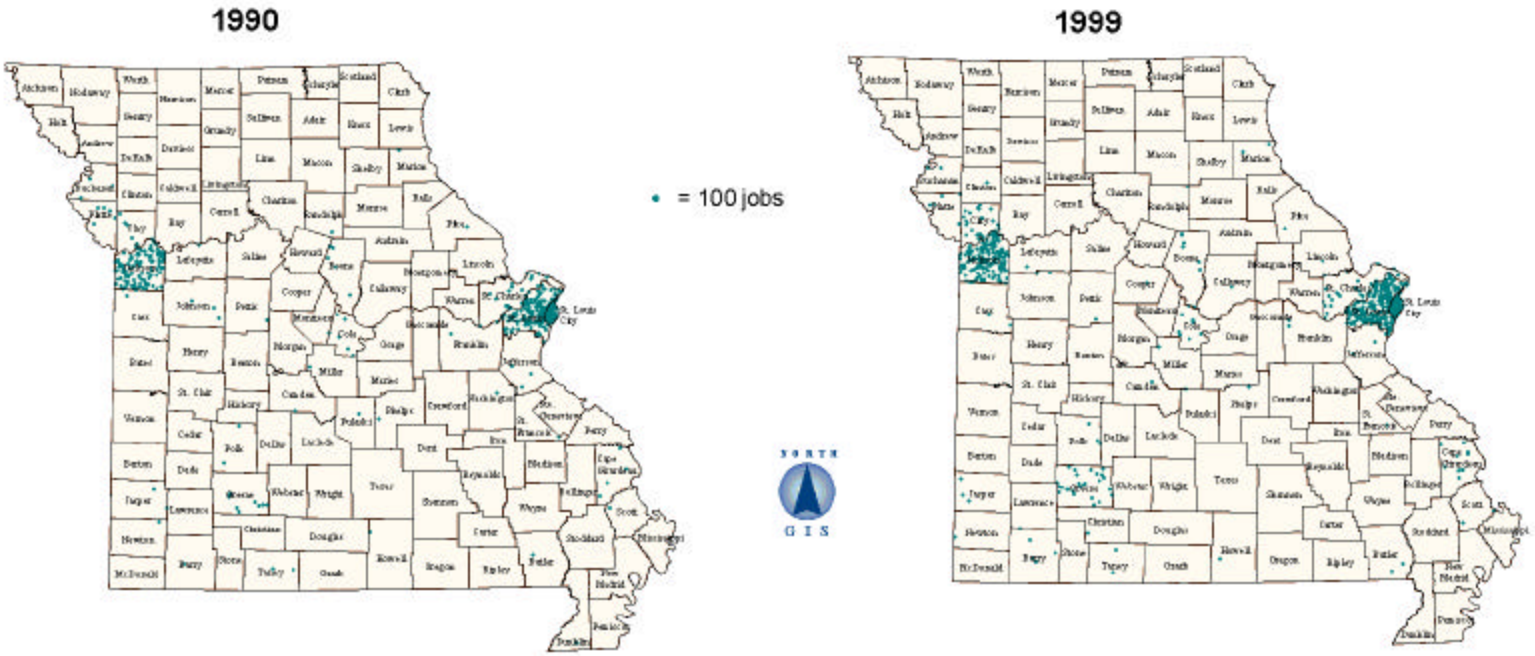
Information Technology Sector
Employment Specialization Ratios



Includes telephone communications; telegraph and other message communications; cable and other pay television stations; other communication services; computer programming services; prepackaged software; computer integrated systems design; computer and data processing; information retrieval services; computer facilities management; computer rental and leasing; computer maintenance and repair; and other computer services.

Source: ES-202, Missouri Department of Economic Development

Information Technology Sector Employment



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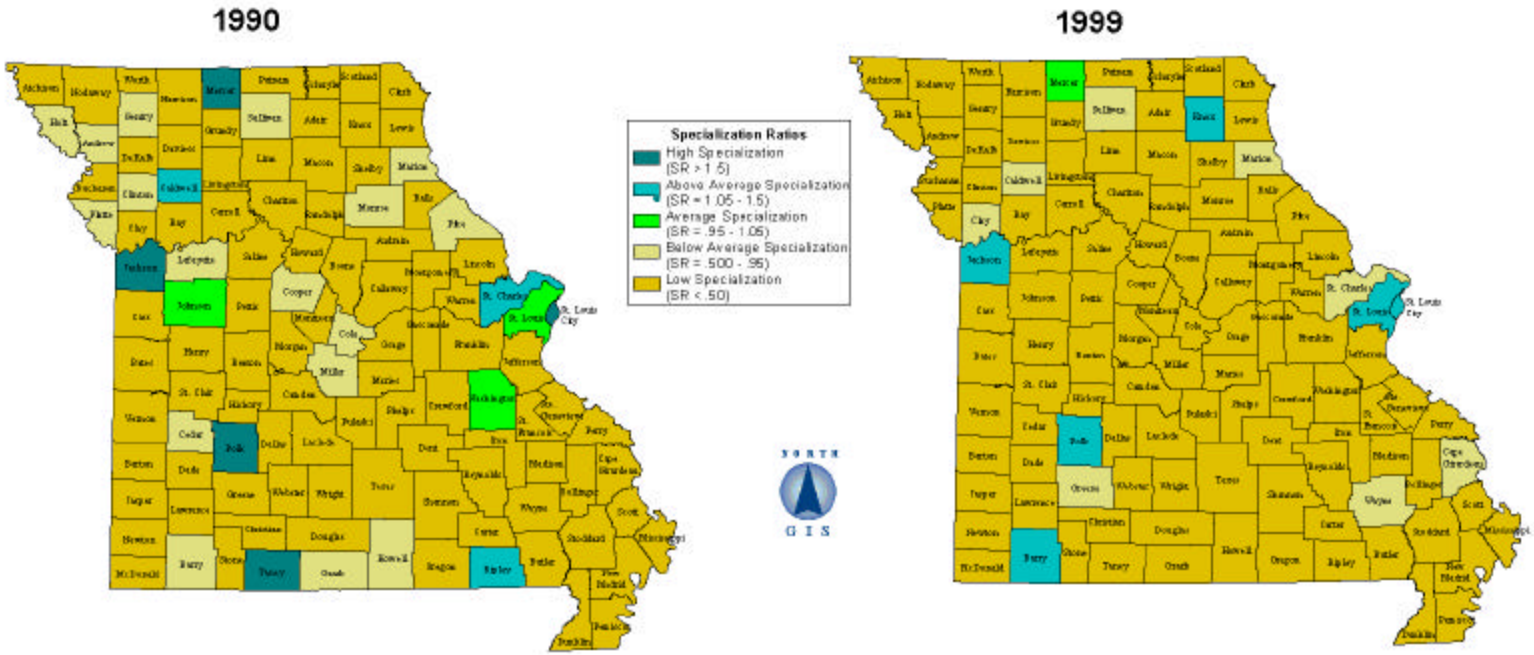
Source: ES-202, Missouri Department of Economic Development

Information Technology Sector
Wage Specialization Ratios



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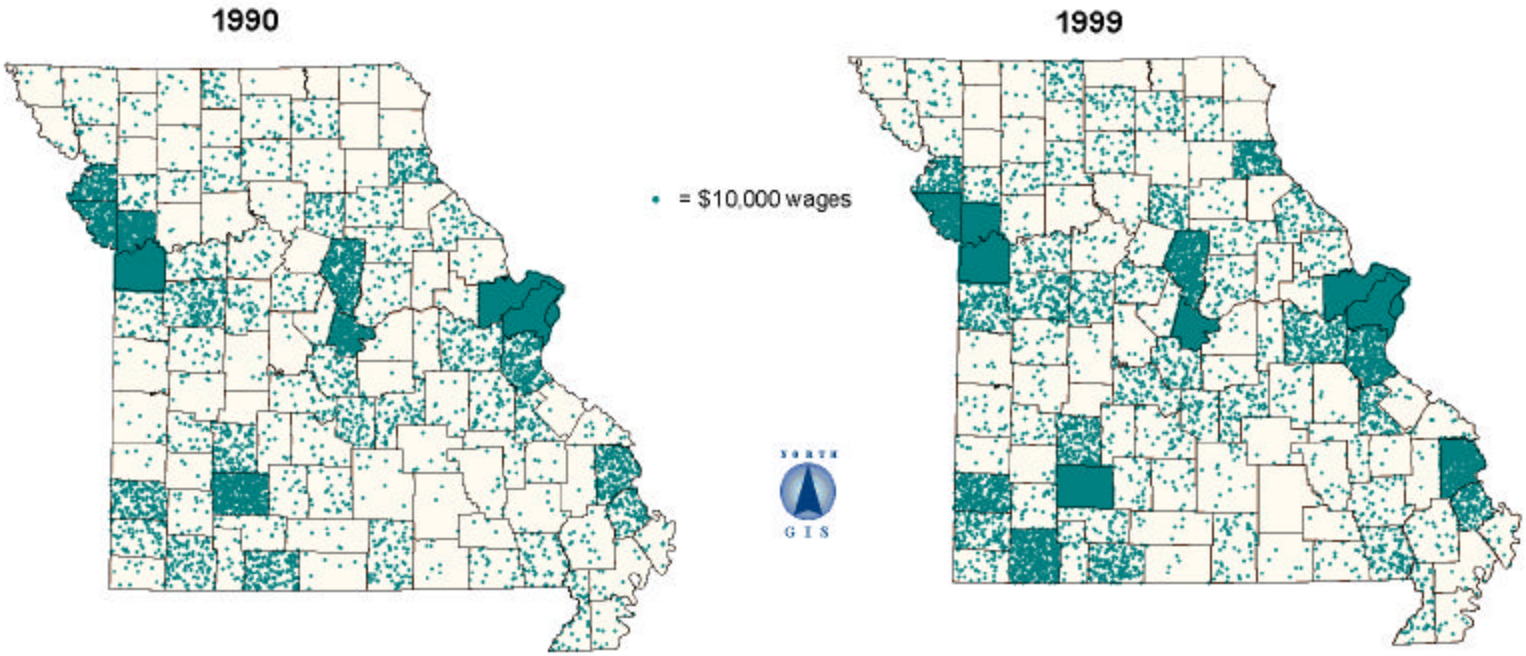
Source: ES-202, Missouri Department of Economic Development

Information Technology Sector
Wages



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Source: ES-202, Missouri Department of Economic Development

The impact of new IT firms in the state is substantial. For instance, the creation of 100 jobs in the IT sector would produce $5,066,327 in wages statewide, resulting in an average wage per job of $50,663. This direct impact would also create an additional 190 ancillary jobs and $4,896,179 in wages, for a total impact of 290 jobs and $9,962,506 in wages across Missouri. It is important to note that this model assumes that 100% of industry inputs (labor, materials, etc.) are purchased from Missouri firms. According to IMPLAN estimates, the IT sector purchases only 62.9% of its inputs from firms within the state. Refer to Table 4.

Table 4
Employment Impacts of the
Information Technology Sector in Missouri, 1999
Per 100 Job Increase. Assumes 100% Local Impact.

SECTOR	Employment			
	Direct	Indirect	Induced	**TOTAL**
Information Technology	100.0	11.3	1.7	**113.0**
Agriculture	0.0	0.8	2.4	**3.2**
Mining	0.0	0.0	0.1	**0.1**
Construction	0.0	4.7	1.5	**6.1**
Manufacturing	0.0	3.8	6.1	**9.9**
Transportation & Public Utilities	0.0	1.8	4.9	**6.7**
Retail/Wholesale Trade	0.0	7.3	37.9	**45.3**
Finance, Insur. & Real Estate	0.0	3.4	11.8	**15.2**
Services	0.0	30.4	51.4	**81.8**
Government	0.0	0.5	6.5	**7.0**
Other	0.0	0.0	1.5	**1.5**
TOTAL	**100.0**	**64.1**	**125.8**	**289.9**

Source: IMPLAN

Apart from the IT sector, the Services (increase of 82 jobs and $1,784,650 in wages) and Retail/Wholesale Trade (increase of 45 jobs and $897,931 in wages) sectors would be most positively affected by the direct impact of 100 IT jobs. Although the indirect and induced employment effects are greatest in the Services sector, the average wage per job is quite low ($21,817) compared to the IT sector ($59,848). This indicates that although the IT sector creates fewer jobs, the average wage of those jobs is high. Moderate wage increases would also occur in the Finance, Insurance and Real Estate (increase of $456,519) and Manufacturing (increase of $433,603) sectors. Conversely, it appears that the Mining and Agriculture sectors would be least affected, gaining less than 5 jobs each. Refer to Table 5.

Table 5
Payroll Impacts of the
Information Technology Sector in Missouri, 1999
Per 100 Job Increase. Assumes 100% Local Impact.

SECTOR	Payroll			
	Direct	Indirect	Induced	**TOTAL**
Information Technology	5,066,327	572,071	86,258	**5,724,656**
Agriculture	0	2,427	7,337	**9,764**
Mining	0	1,764	3,173	**4,938**
Construction	0	128,618	41,194	**169,812**
Manufacturing	0	166,927	266,676	**433,603**
Transportation & Public Utilities	0	63,235	172,391	**235,626**
Retail/Wholesale Trade	0	145,829	752,102	**897,931**
Finance, Insur. & Real Estate	0	102,079	354,440	**456,519**
Services	0	663,690	1,120,960	**1,784,650**
Government	0	16,847	214,647	**231,494**
Other	0	0	13,513	**13,513**
TOTAL	**5,066,327**	**1,863,487**	**3,032,692**	**9,962,506**

Source: IMPLAN

B. IT Software Subsector

The IT Software subsector sector includes computer programming services; and prepackaged software. These companies make up the smallest number of firms in the overall IT sector. There are only seven firms with more than 250 employees, and only one has 1,000 or more. All but one of the firms is involved in computer programming and software development, while the largest deals in prepackaged software. Refer to Table 6.

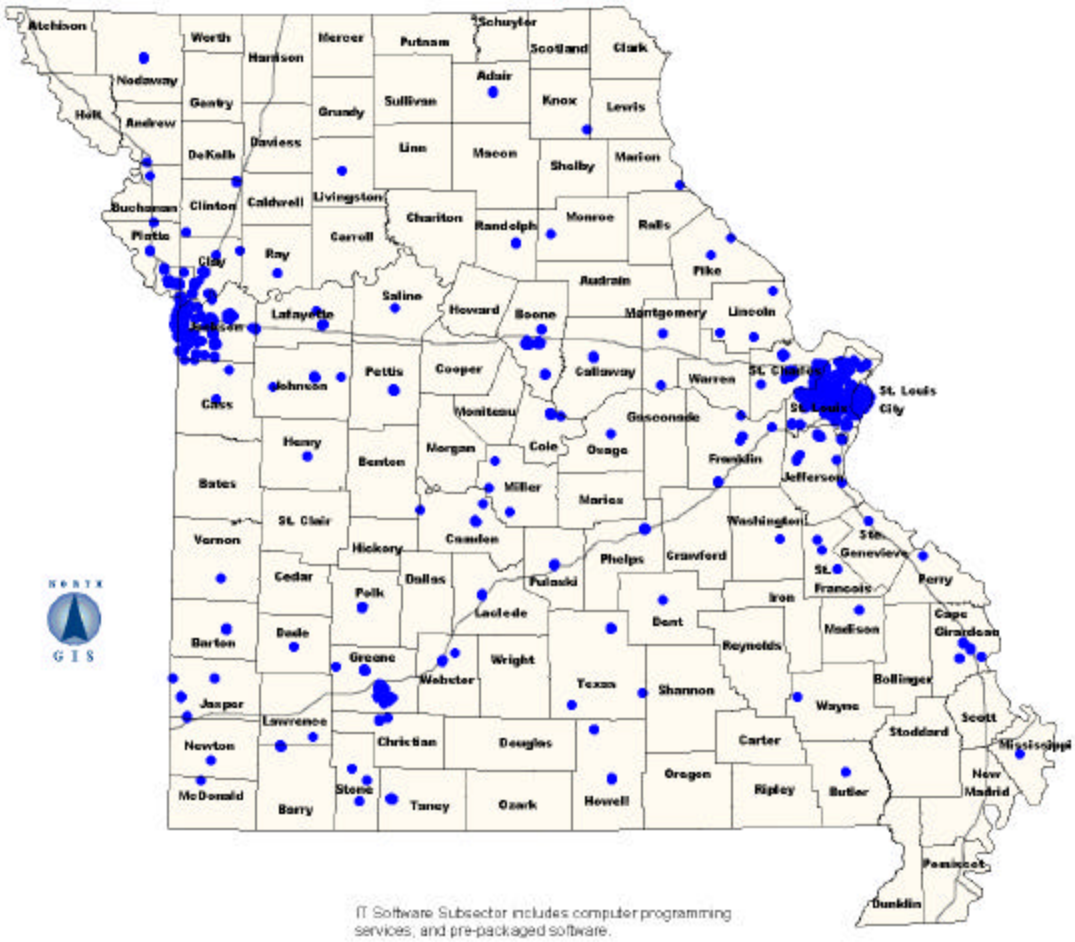
Table 6
Largest Employers in the IT Software Subsector in Missouri, 1999

Company	City	SIC Description	Employment
Cerner Corporation	Kansas City	Business oriented computer software	1,000 to 2,499
Business Response Inc	Saint Louis	Custom computer programming services	500 to 999
ISSC	Saint Louis	Custom computer programming services	500 to 999
Family Films	Saint Louis	Computer software development	250 to 499
International Bus Mchs Corp	Kansas City	Custom computer programming services	250 to 499
Jack Henry & Associates Inc	Monett	Computer software development	250 to 499
Navisys	Saint Louis	Software programming applications	250 to 499

Source: Dun and Bradstreet

Analysis of SRs indicate that IT Software employment is concentrated in St. Louis County, Jefferson City, Lincoln County, and Wayne County (Piedmont); and to a lesser degree in Springfield. However, in nominal terms employment is concentrated in the larger metro areas of the state – St. Louis, Kansas City, Springfield, and Jefferson City. IT Software wages also follow this pattern, with nominal wages concentrated in St. Louis, Kansas City, Springfield, and Columbia/Jefferson City. It is important to note that SRs measure the proportion of sector employment relative to the state average, and ***not*** the total number of jobs. The maps below outline employment and wages in the IT Software subsector.

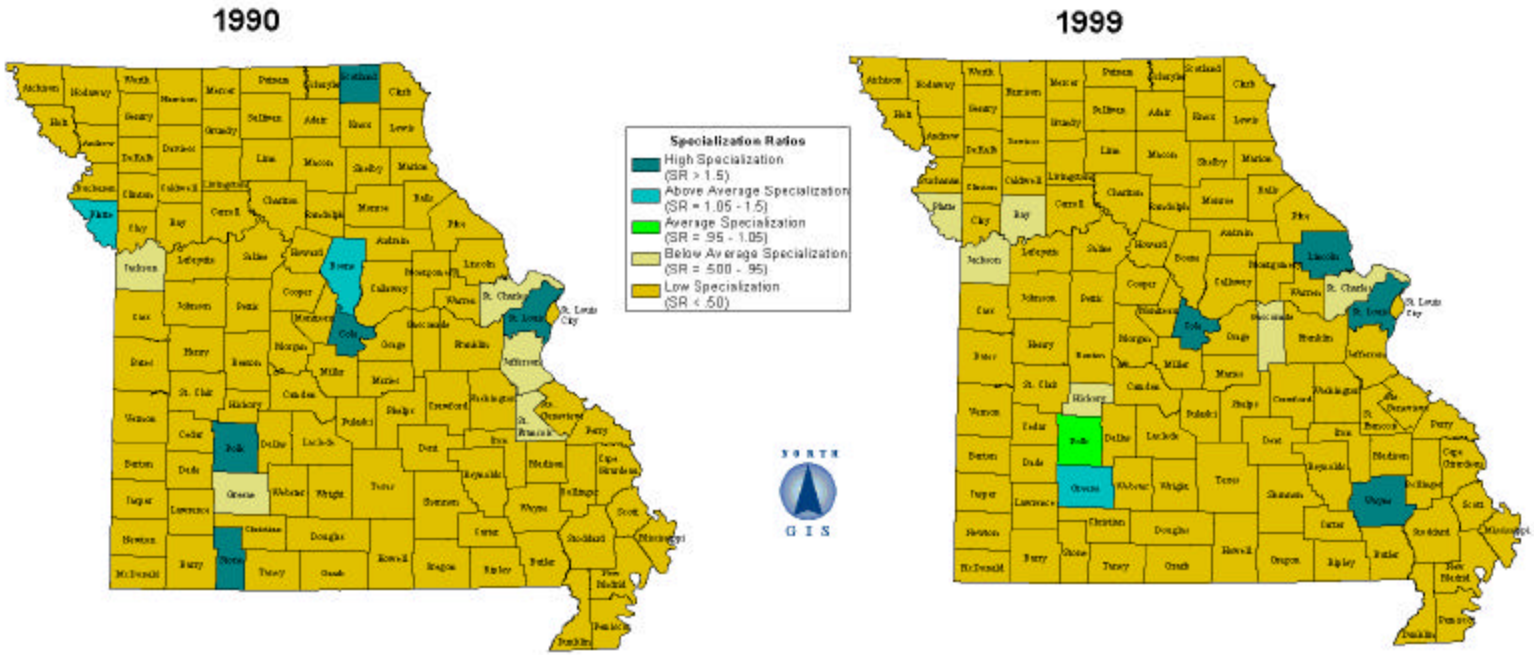
IT Software Subsector
Location of Firms



IT Software Subsector includes computer programming services, and pre-packaged software.

Source: Dun and Bradstreet

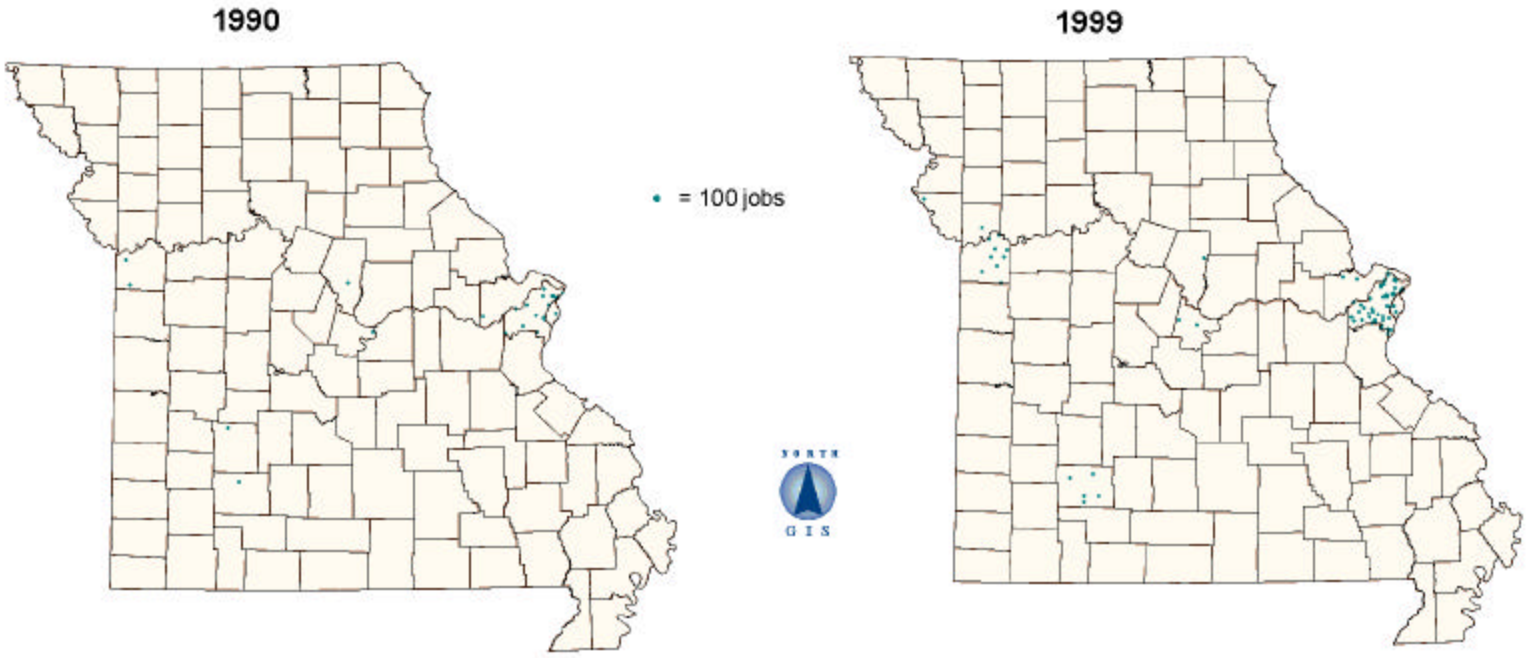
IT Software Subsector
Employment Specialization Ratios



IT Software Subsector includes computer programming services; and prepackaged software;

Source: ES-202, Missouri Department of Economic Development

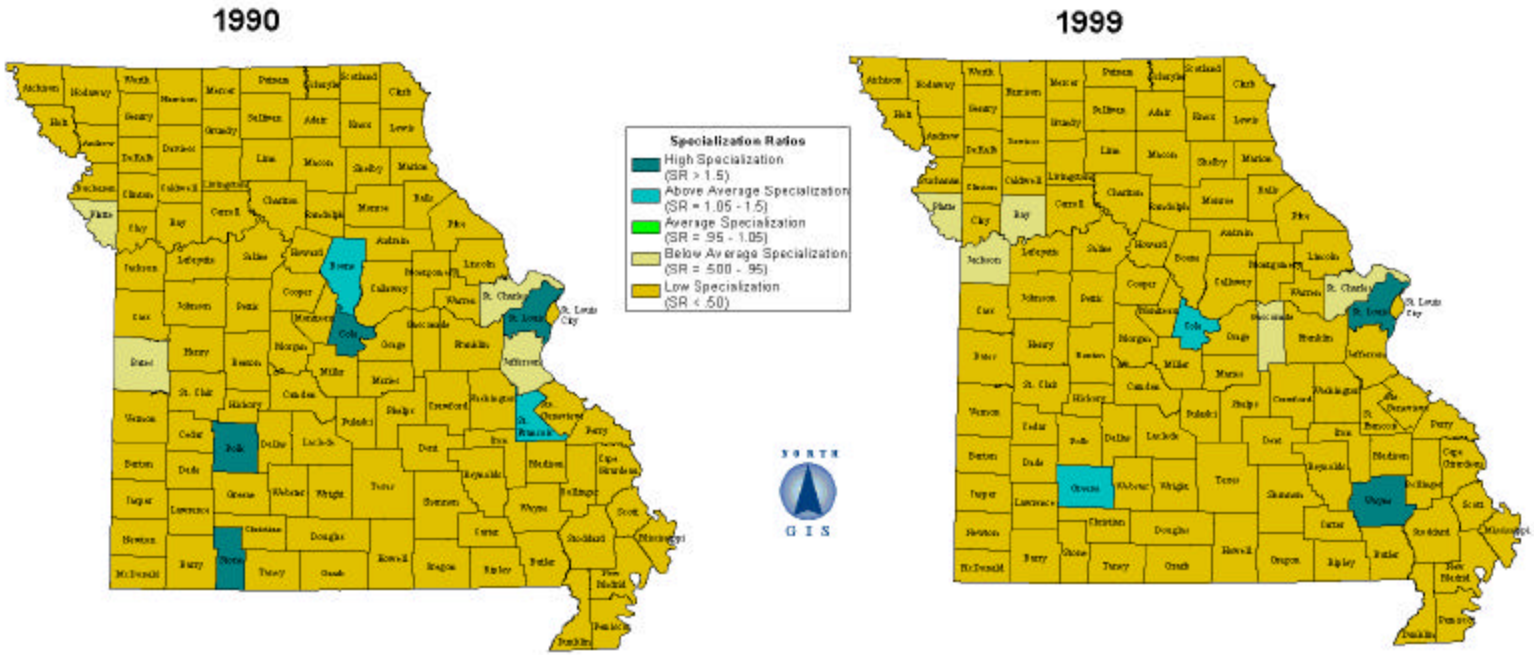
IT Software Subsector Employment



IT Software Subsector includes computer programming services; and prepackaged software;

Source: ES-202, Missouri Department of Economic Development

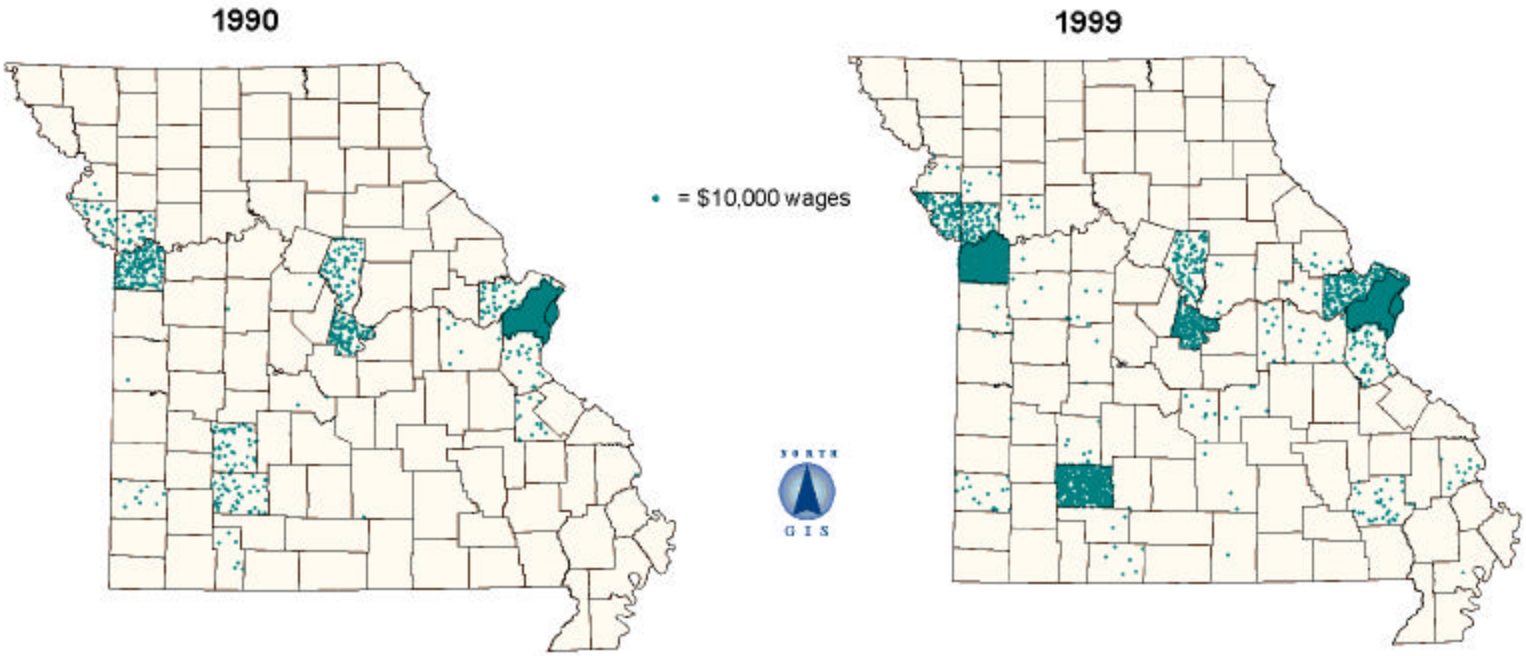
IT Software Subsector
Wage Specialization Ratios



IT Software Subsector includes computer programming services; and prepackaged software;

Source: ES-202, Missouri Department of Economic Development

IT Software Subsector
Wages



IT Software Subsector includes computer programming services; and prepackaged software;

Source: ES-202, Missouri Department of Economic Development

The importance of new IT Software firms in the state is substantial. For instance, the creation of 100 jobs in the IT Software subsector would produce $4,879,111 in wages statewide, resulting in an average wage per job of $48,791. This direct impact of would also create an additional 142 ancillary jobs and $3,642,472 in wages, for a total impact of 242 jobs and $8,521,583 in wages across Missouri. It is important to note that this model assumes that 100% of industry inputs (labor, materials, etc.) are purchased from Missouri firms. According to IMPLAN estimates, the IT Software subsector purchases only 63% of its inputs from firms within the state. Refer to Table 7.

Table 7
Employment Impacts of the
IT Software Subsector in Missouri, 1999
Per 100 Job Increase. Assumes 100% Local Impact.

SECTOR	Employment			
	Direct	Indirect	Induced	**TOTAL**
Software	100.0	7.6	0.8	**108.5**
Agriculture	0.0	0.5	2.1	**2.6**
Mining	0.0	0.0	0.1	**0.1**
Construction	0.0	0.5	1.3	**1.8**
Manufacturing	0.0	2.5	5.3	**7.8**
Transportation & Public Utilities	0.0	2.0	4.8	**6.8**
Retail/Wholesale Trade	0.0	4.9	33.1	**38.0**
Finance, Insur. & Real Estate	0.0	1.9	10.3	**12.2**
Services	0.0	13.0	44.8	**57.8**
Government	0.0	0.1	5.4	**5.5**
Other	0.0	0.0	0.6	**0.6**
TOTAL	**100.0**	**33.1**	**108.5**	**241.6**

Coefficients for SIC 737 used as a proxy.
Source: IMPLAN

Apart from the IT Software subsector, the Services (increase of 58 jobs and $1,260,572 in wages) and Retail/Wholesale Trade (increase of 38 jobs and $753,825 in wages) sectors would be most positively affected by the direct impact of 100 IT Software jobs. Although the indirect and induced employment effects are greatest in the Services sector, the average wage per job is quite low ($21,809) compared to the IT Software subsector ($49,154). This indicates that although the IT Software subsector creates fewer jobs, the average wage of those jobs is high. Conversely, it appears that the Mining, Construction, Agriculture, and Government sectors would be least affected, each gaining 5 jobs or less. Refer to Table 8.

Table 8
Payroll Impacts of the
IT Software Subsector in Missouri, 1999
Per 100 Job Increase. Assumes 100% Local Impact.

SECTOR	Payroll			
	Direct	Indirect	Induced	**TOTAL**
Software	4,879,111	372,302	40,595	**5,292,008**
Agriculture	0	1,497	6,397	**7,894**
Mining	0	1,187	2,689	**3,876**
Construction	0	14,653	35,976	**50,629**
Manufacturing	0	109,073	232,334	**341,408**
Transportation & Public Utilities	0	75,844	182,672	**258,517**
Retail/Wholesale Trade	0	97,997	655,828	**753,825**
Finance, Insur. & Real Estate	0	57,412	309,067	**366,479**
Services	0	284,103	976,468	**1,260,572**
Government	0	2,367	178,947	**181,314**
Other	0	0	5,062	**5,062**
TOTAL	**4,879,111**	**1,016,437**	**2,626,035**	**8,521,583**

Coefficients for SIC 737 used as a proxy.
Source: IMPLAN

Case Study: IT Software in Piedmont, Missouri

Wayne County, in the Bootheel region of Missouri, was identified as having a large proportion of IT sector employment and wages relative to the state average, especially in the IT Software subsector. Three IT firms are located in the county, with the majority concentrated in Piedmont. The community of Piedmont has a population of 2,166, and is located 120 miles south of St. Louis in a sparsely populated area (17 people per square mile). Additionally, the U.S. Department of Agriculture has classified Wayne County as persistently poor[3].

	Wayne County		Missouri	
	Number	Change from 1990	Number	Change from 1990
Population 1999	13,046	12.9%	5,468,338	6.7%
Unemployment 1999	266	7.8%	95,949	3.4%
Per Capita Income 1999	$14,002	36.4%	$25,150	41.7%

The largest IT employer in Wayne County is McAllister Software Systems. McAllister develops the veterinary software system called AVImark. This software permits veterinary clinics to track clients, arrange appointments and treatment schedules, compile treatment histories, track inventories, generate estimates, and to create detailed medical records from diagnoses. Since the most recent release of AVImark in May 2000, over 3,000 veterinary clinics have purchased the software. The company has also grown from 6 employees in 1996 to over 50 today; and the company plans to expand beyond this current number. To house this growth in employees, McAllister recently completed construction of a new 6,000 square foot corporate headquarters in Piedmont.

McAllister Software Systems was founded in 1986 by Richard and Roger McAllister, who were born and raised near Piedmont. The company identifies with Piedmont's small-town values, emphasizing business practices that are "morally right and fair". Further, McAllister prides itself on hiring employees of good reputation and character[4].

[3] Persons with poverty-level income in the proceeding year were 20 percent or more of total population in each of 4 years: 1960, 1970, 1980, 1990.
[4] From McAllister Software Systems. http://www.avimark.net

Largest Employers in the IT Sector in Wayne County, Missouri, 1999

Company	City	SIC Description	Employment
McAllister Software Systems	Piedmont	Prepackaged software	50-99
B & B Computing	Piedmont	Online service providers	2 to 4
Warlock Underground Cable	Wappapello	Cable television services	NA

Source: Dun and Bradstreet

It appears that McAllister Software Systems located and remained in Piedmont because of the owners' strong ties to the area. The company seems to value the quality and character of the community and its employees in Piedmont. Further, it appears that having their corporate headquarters in rural Missouri is a symbolic asset in doing business with veterinary firms.

C. IT Services Subsector

The IT Services subsector includes computer integrated systems design; computer and data processing; information retrieval services; computer facilities management; computer rental and leasing; computer maintenance and repair; and other computer services. Many of the top IT Services firms are involved in data processing. The remaining companies are involved in systems integration, computer maintenance and repair, information retrieval, and computer facilities management. Refer to Table 9.

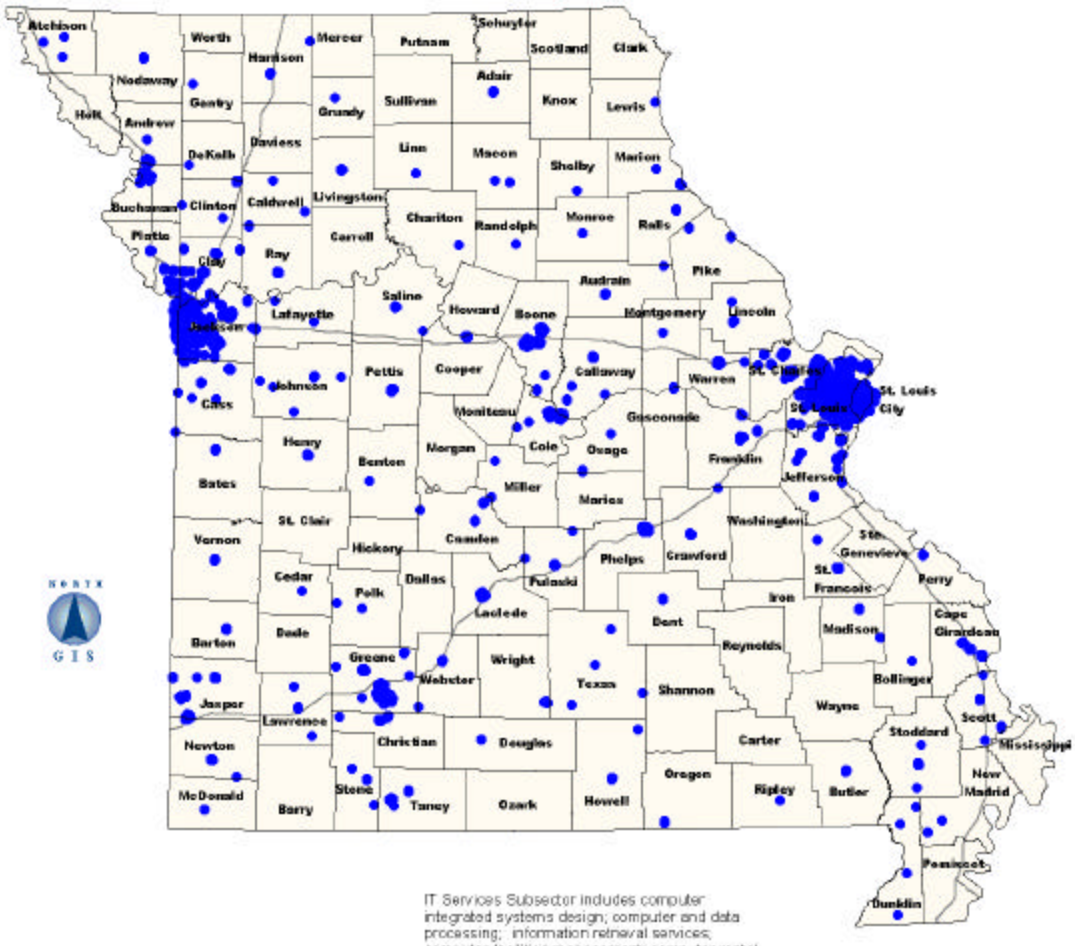
Table 9
Largest Employers in the IT Services Subsector in Missouri, 1999

Company	City	SIC Description	Employment
A G Edwards & Sons Inc	Saint Louis	Data processing service	2,500 to 4,999
St Johns Mercy Medical Center	Saint Louis	Data processing service	1,000 to 2,499
The Boeing Company	Hazelwood	Systems integration services	1,000 to 2,499
The Boeing Company	Saint Louis	Systems integration services	1,000 to 2,499
Bridge	Saint Louis	Information retrieval services	500 to 999
Bridge	Saint Louis	Computer facilities management	500 to 999
E D S Credit Group	Maryland Hghts	Data processing service	500 to 999
Argus Health Systems Inc	Kansas City	Information retrieval services	250 to 499
Automatic Data Processing	Saint Louis	Data processing service	250 to 499
Computer Sciences Corporation	Kansas City	Data processing service	250 to 499
Data Processing Dept	Kansas City	Data processing and preparation	250 to 499
Dst Systems Inc	Kansas City	Data processing and preparation	250 to 499
National Financial Data Svcs	Kansas City	Data processing service	250 to 499
Sst	Saint Joseph	Data processing and preparation	250 to 499
Xerox Corporation	Bridgeton	Computer maintenance and repair	250 to 499

Source: Dun and Bradstreet

Analysis of SRs indicate that IT Services employment is concentrated in St. Louis County, northern Kansas City, Barry County (Monett), Maries County (Vienna), and Polk County (Bolivar); and to a lesser degree in Kansas City and Bowling Green. However, in nominal terms employment is concentrated in the core metro areas of the state – St. Louis and Kansas City – as well as in Barry County.
IT Services wages also follow this pattern, with nominal wages concentrated in St. Louis, Kansas City, Barry County, Columbia/Jefferson City, and Springfield. Recall that SRs measure the proportion of sector employment relative to the state average, and ***not*** the total number of jobs. The maps below outline employment and wages in the IT Services subsector.

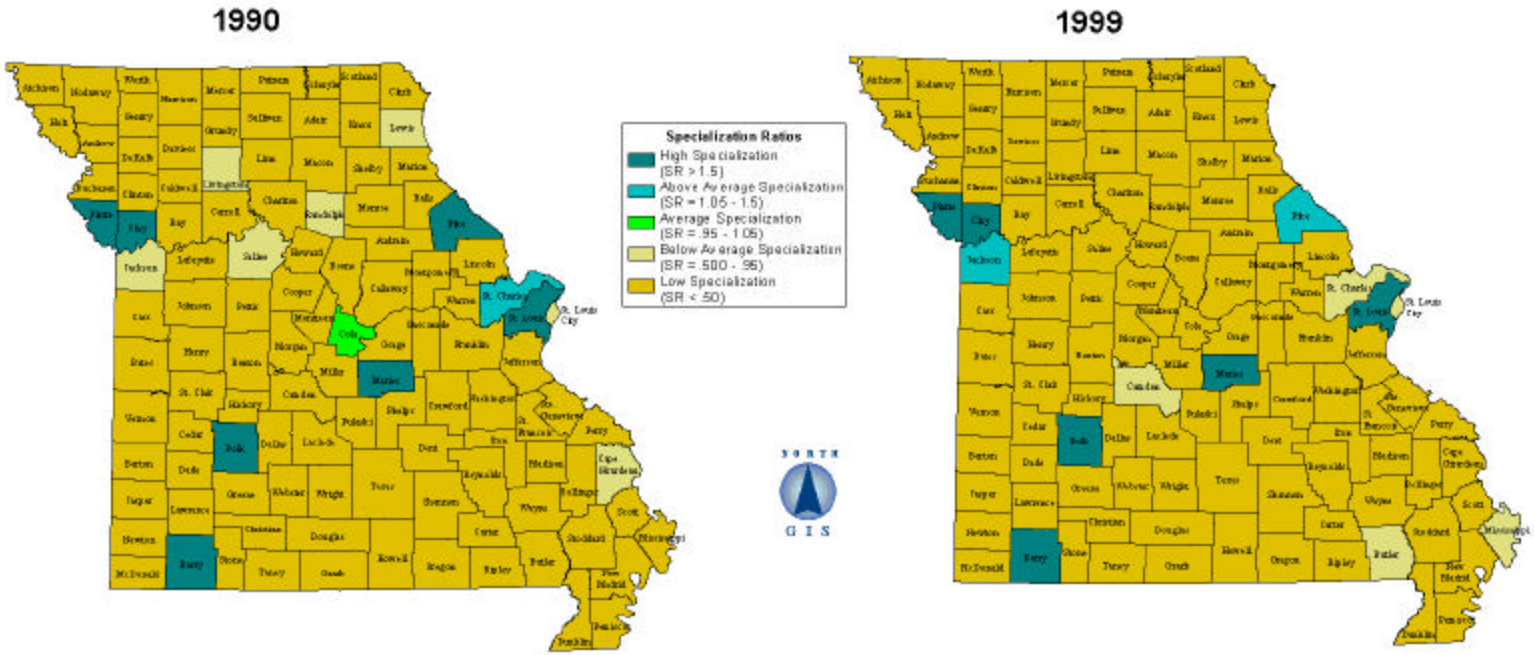
IT Services Subsector
Location of Firms



IT Services Subsector includes computer integrated systems design; computer and data processing; information retrieval services; computer facilities management; computer rental and leasing; computer maintenance and repair; and other computer services.

Source: Dun and Bradstreet

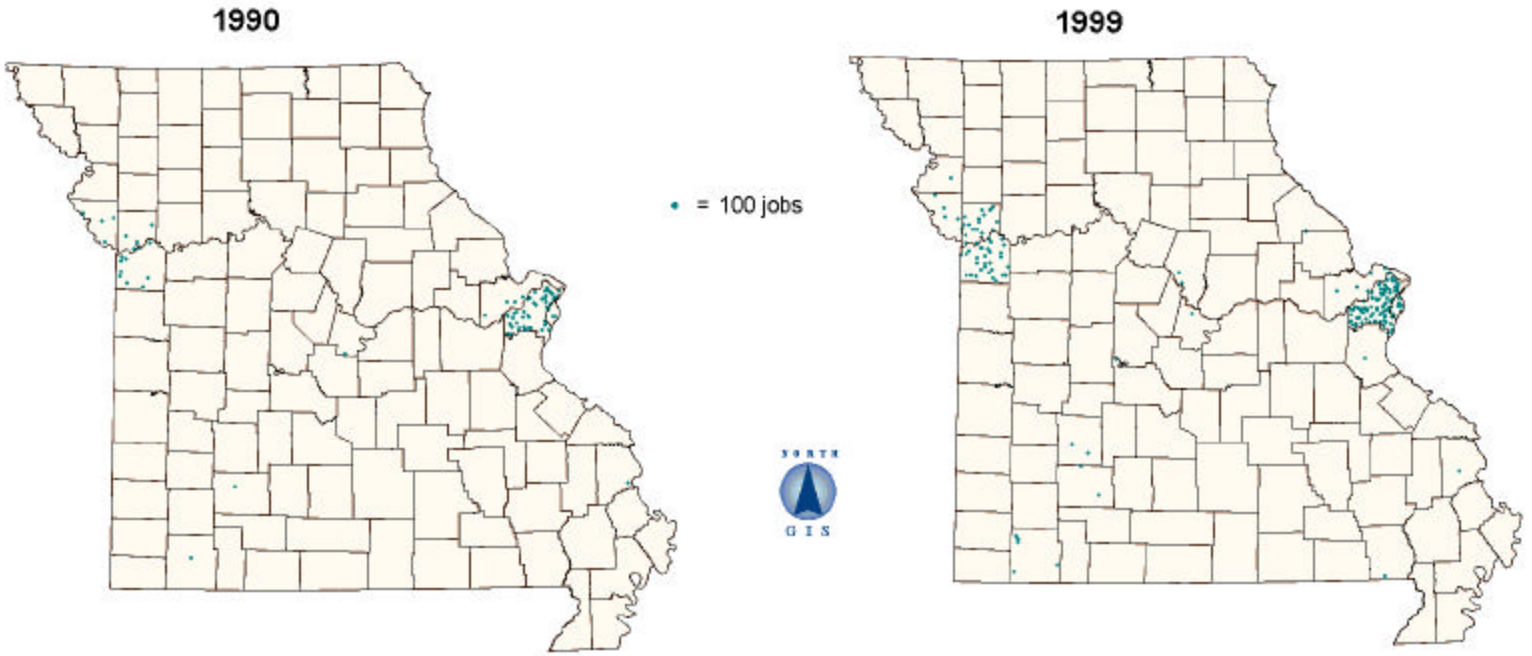
IT Services Subsector
Employment Specialization Ratios



IT Services Subsector includes computer integrated systems design; computer and data processing; information retrieval services; computer facilities management; computer rental and leasing; computer maintenance and repair; and other computer services.

Source: ES-202, Missouri Department of Economic Development

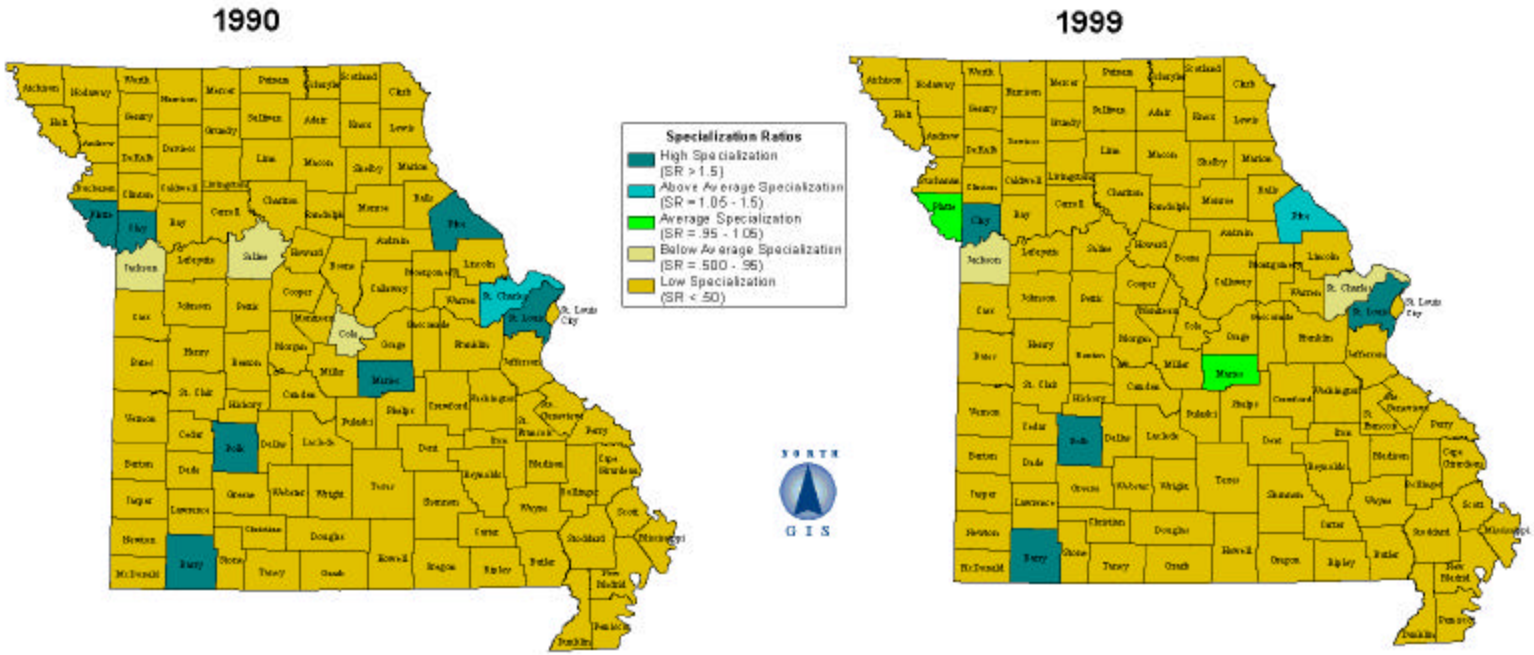
IT Services Subsector Employment



IT Services Subsector includes computer integrated systems design; computer and data processing; information retrieval services; computer facilities management; computer rental and leasing; computer maintenance and repair; and other computer services.

Source: ES-202, Missouri Department of Economic Development

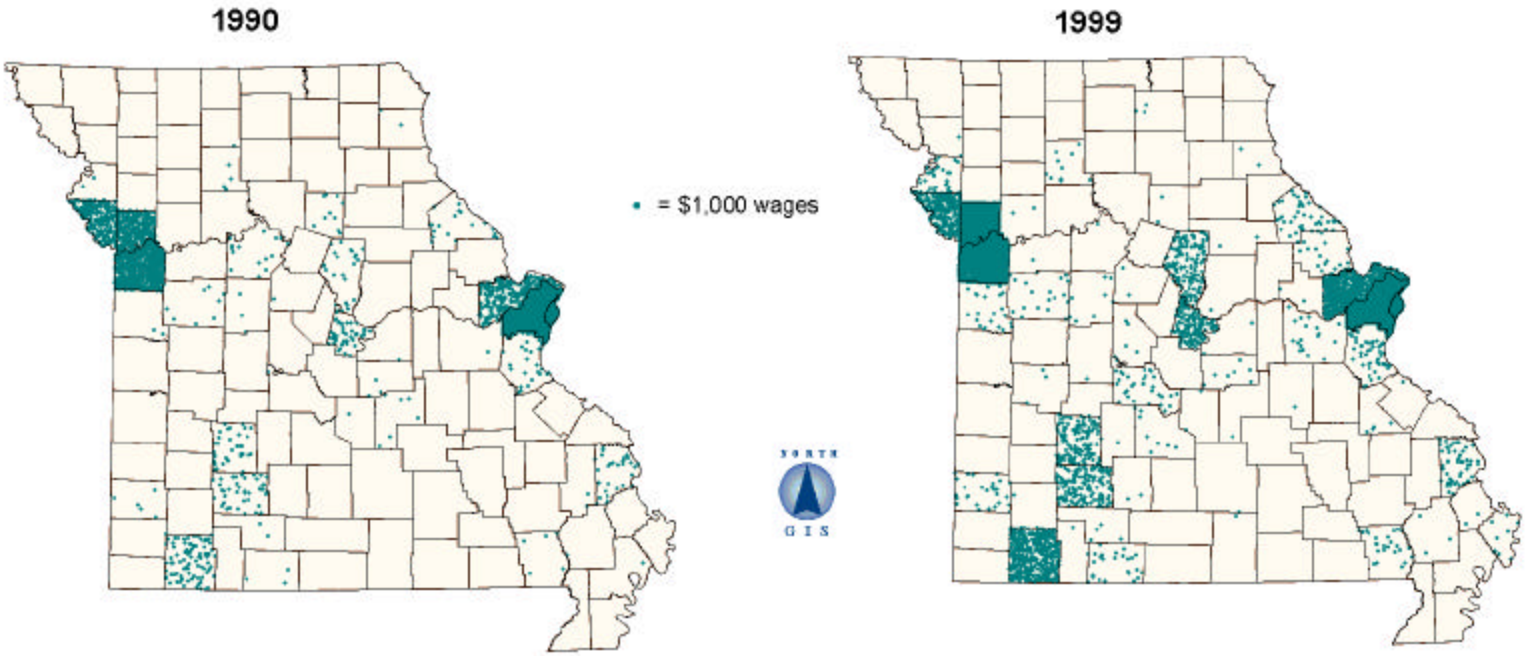
IT Services Subsector
Wage Specialization Ratios



IT Services Subsector includes computer integrated systems design; computer and data processing; information retrieval services; computer facilities management; computer rental and leasing; computer maintenance and repair; and other computer services.

Source: ES-202, Missouri Department of Economic Development

IT Services Subsector Wages



IT Services Subsector includes computer integrated systems design; computer and data processing; information retrieval services; computer facilities management; computer rental and leasing; computer maintenance and repair; and other computer services.

Source: ES-202, Missouri Department of Economic Development

The impact of new IT Services firms in the state is substantial. For instance, the creation of 100 jobs in the IT Services subsector would produce $4,879,111 in wages statewide, resulting in an average wage per job of $48,791. This direct impact would also create an additional 142 ancillary jobs and $3,642,472 in wages, for a total impact of 242 jobs and $8,521,583 in wages across Missouri. It is important to note that this model assumes that 100% of industry inputs (labor, materials, etc.) are purchased from Missouri firms. According to IMPLAN estimates, the IT Services subsector purchases only 63% of its inputs from firms within the state. Refer to Table 10.

Table 10
Employment Impacts of the
IT Services Subsector in Missouri, 1999
Per 100 Job Increase. Assumes 100% Local Impact.

SECTOR	Employment			
	Direct	Indirect	Induced	**TOTAL**
IT Services	100.0	7.6	0.8	**108.5**
Agriculture	0.0	0.5	2.1	**2.6**
Mining	0.0	0.0	0.1	**0.1**
Construction	0.0	0.5	1.3	**1.8**
Manufacturing	0.0	2.5	5.3	**7.8**
Transportation & Public Utilities	0.0	2.0	4.8	**6.8**
Retail/Wholesale Trade	0.0	4.9	33.1	**38.0**
Finance, Insur. & Real Estate	0.0	1.9	10.3	**12.2**
Services	0.0	13.0	44.8	**57.8**
Government	0.0	0.1	5.4	**5.5**
Other	0.0	0.0	0.6	**0.6**
TOTAL	**100.0**	**33.1**	**108.5**	**241.6**

Coefficients for SIC 737 used as a proxy.
Source: IMPLAN

Apart from the IT Services subsector, the Services (increase of 58 jobs and $1,260,572 in wages) and Retail/Wholesale Trade (increase of 38 jobs and $753,825 in wages) sectors would be most positively affected by the direct impact of 100 IT Services jobs. Although the indirect and induced employment effects are greatest in the Services sector, the average wage per job is quite low ($21,809) compared to the IT Services subsector ($49,154). This indicates that although the IT Services subsector creates fewer jobs, the average wage of those jobs is high. Conversely, it appears that the Mining, Construction, Agriculture, and Government sectors would be least affected, each gaining 5 jobs or less. Refer to Table 11.

Table 11
Payroll Impacts of the
IT Services Subsector in Missouri, 1999
Per 100 Job Increase. Assumes 100% Local Impact.

SECTOR	Payroll			
	Direct	Indirect	Induced	**TOTAL**
IT Services	4,879,111	372,302	40,595	**5,292,008**
Agriculture	0	1,497	6,397	**7,894**
Mining	0	1,187	2,689	**3,876**
Construction	0	14,653	35,976	**50,629**
Manufacturing	0	109,073	232,334	**341,408**
Transportation & Public Utilities	0	75,844	182,672	**258,517**
Retail/Wholesale Trade	0	97,997	655,828	**753,825**
Finance, Insur. & Real Estate	0	57,412	309,067	**366,479**
Services	0	284,103	976,468	**1,260,572**
Government	0	2,367	178,947	**181,314**
Other	0	0	5,062	**5,062**
TOTAL	**4,879,111**	**1,016,437**	**2,626,035**	**8,521,583**

Coefficients for SIC 737 used as a proxy.
Source: IMPLAN

Case Study: IT Services in Monett, Missouri

Barry County, in southwest Missouri, was identified as having a large proportion of IT sector employment and wages relative to the state average, especially in the IT Services subsector. Roughly 14 firms engaged in IT are located in the county, with the majority concentrated in Monett. The community of Monett (population 6,529) is 10 miles from Interstate 44 and within close proximity of two metropolitan areas - with Joplin 35 miles to the west and Springfield 40 miles to the east.

	Barry County		Missouri	
	Number	Change from 1990	Number	Change from 1990
Population 1999	33,189	20.0%	5,468,338	6.7%
Unemployment 1999	549	3.6%	95,949	3.4%
Per Capita Income 1999	$18,215	44.8%	$25,150	41.7%

The largest IT employer in Barry County is Jack Henry and Associates (JHA). In 1977, John W. "Jack" Henry founded the firm with two other former employees after the small Monett bank they worked for was bought out. By 1999, JHA had expanded its customer base by 50 percent with the acquisition of BancTec and BancData Solutions. The firm had $184.5 million in annual sales in 1999, of which 37 percent was services, 37 percent hardware, and 26 percent software. JHA currently employs 1,589 people in 12 states.

JHA provides a range of IT products and services geared towards small banks and credit unions, allowing them to automate transactions and data processing. The firm offers several types of products that include automated voice response systems, check imaging systems, document imaging systems, Internet banking, account management systems, and payroll automation systems. In addition, JHA provides services like data processing, disaster recovery, web design/hosting, and software installation and maintenance.

Largest Employers in the IT Sector in Barry County, Missouri, 1999

Company	City	SIC Description	Employment
Jack Henry & Associates Inc	Monett	Computer software development	250 to 499
Midwest Paging	Purdy	Radio pager (beeper) communication services	10 to 24
Shell Knob Cable TV	Shell Knob	Cable and other pay television services	10 to 24
GTE Corporation	Cassville	Telephone communication, except radio	5 to 9
Cox Communications Inc	Monett	Cable and other pay television services	5 to 9
Russell Cellular	Cassville	Cellular telephone services	2 to 4
Information Technology Partner	Monett	Computer software development	2 to 4
Systems Marketing Incorporated	Monett	Computer software development	2 to 4
MO-Net Inc	Monett	Online service providers	2 to 4
Softnet Inc	Monett	Proprietary online service networks	2 to 4
Jims Satellite & Antenna	Shell Knob	Satellite master antenna systems services	2 to 4
Software Solutions 400 Inc	Monett	Computer software systems analysis and design	NA
Long Distance Telephone	Monett	Long distance telephone communications	NA
Telephone Co	Purdy	Local & long distance telephone communications	NA

Source: Dun and Bradstreet

It appears that JHA located and remained in Monett because of the owners' ties to the community. This is similar to the case of McAllister Software Systems in Piedmont, which is also a owned by a long-time resident. It remains to be seen whether JHA will stay in Monett if control of the company moves out of the family.

D. IT Telecommunication Services Subsector

The IT Telecommunication Services subsector includes telephone communications; telegraph and other messaging communications; cable and other pay television stations; other communication services. IT Telecommunication Services firms have the highest employment of the overall IT sector. The largest companies all employ over 500 people. All but one are involved in telephone services. The remaining companies fall under data communication services. Refer to Table 12.

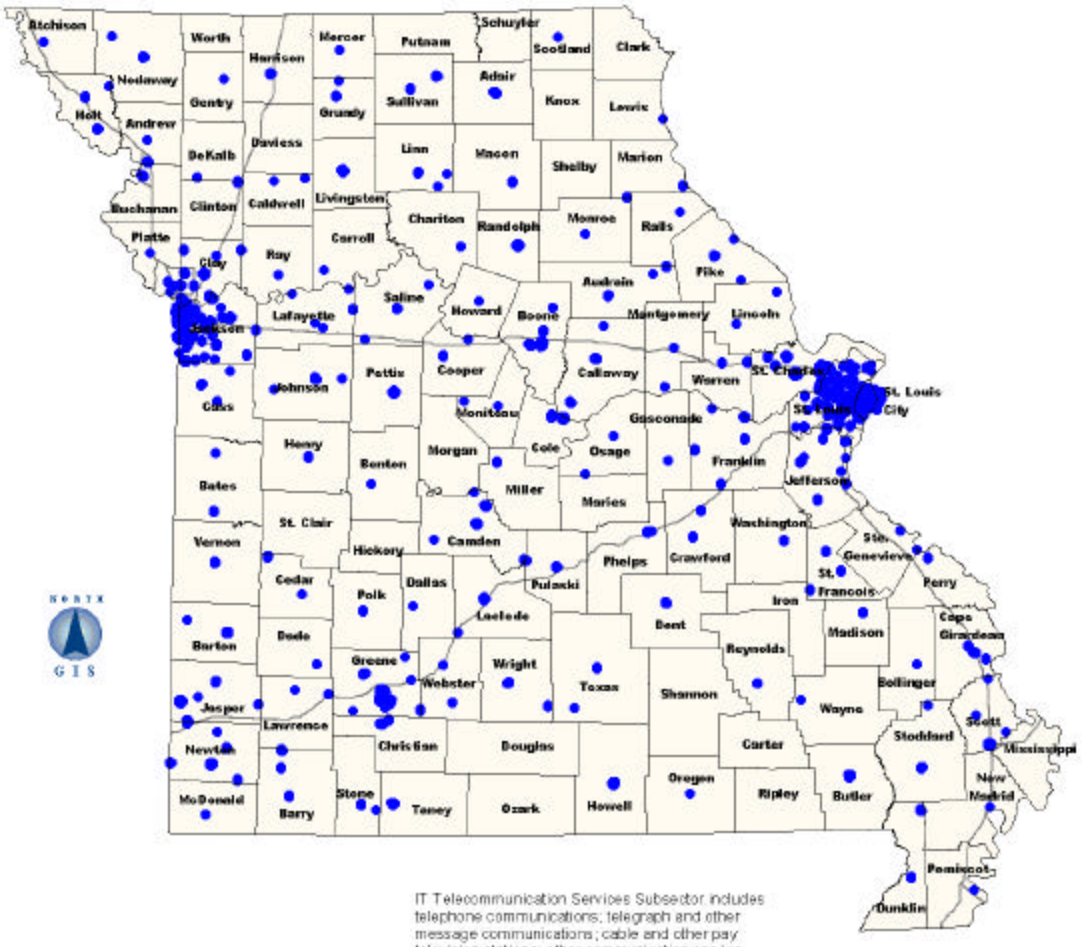
Table 12
Largest Employers in the IT Telecommunication Services Subsector in Missouri, 1999

Company	City	SIC Description	Employment
AT&T Corp	Kansas City	Local and long distance telephone telecomm	2,500 to 4,999
Maritz Performance Imprv Co	Fenton	Data communication services	2,500 to 4,999
Trans World Airlines Inc	Kansas City	Long distance telephone communications	2,500 to 4,999
GTE Midwest Incorporated	Wentzville	Telephone communication, except radio	1,000 to 2,499
MCI Worldcom Network Services	Springfield	Telephone communication, except radio	1,000 to 2,499
Southwestern Bell Telephone	Saint Louis	Local telephone communications	1,000 to 2,499
SPRINT PCS	Kansas City	Telephone communication, except radio	1,000 to 2,499
A T & T	Kansas City	Telephone communication, except radio	500 to 999
AT&T	Kansas City	Telephone communication, except radio	500 to 999
AT&T Cbsc	Kansas City	Telephone communication, except radio	500 to 999
MCI Internal Vnet	Earth City	Long distance telephone communications	500 to 999
Sprint Communications Co LP	Kansas City	Long distance telephone communications	500 to 999
Sprint Corporation	Kansas City	Local and long distance telephone telecomm	500 to 999
Western Union Fincl Svcs Inc	Bridgeton	Telegraph and other communications	500 to 999

Source: Dun and Bradstreet

Analysis of SRs indicate that IT Telecommunication Services employment is concentrated in St. Louis City, Kansas City, Cape Girardeau, Cameron, Princeton, and Knox County (Hurdland); and to a lesser degree in St. Charles and Hannibal. However, in nominal terms employment is concentrated in the large metro areas of the state – St. Louis, Kansas City, and Springfield. IT Telecommunication Services wages also follow this pattern, with nominal wages concentrated in St. Louis, Kansas City, Springfield, Columbia/Jefferson City, Cape Girardeau, and Joplin. It is important to note that SRs measure the proportion of sector employment relative to the state average, and ***not*** the total number of jobs. The maps below outline employment and wages in the IT Telecommunication Services subsector.

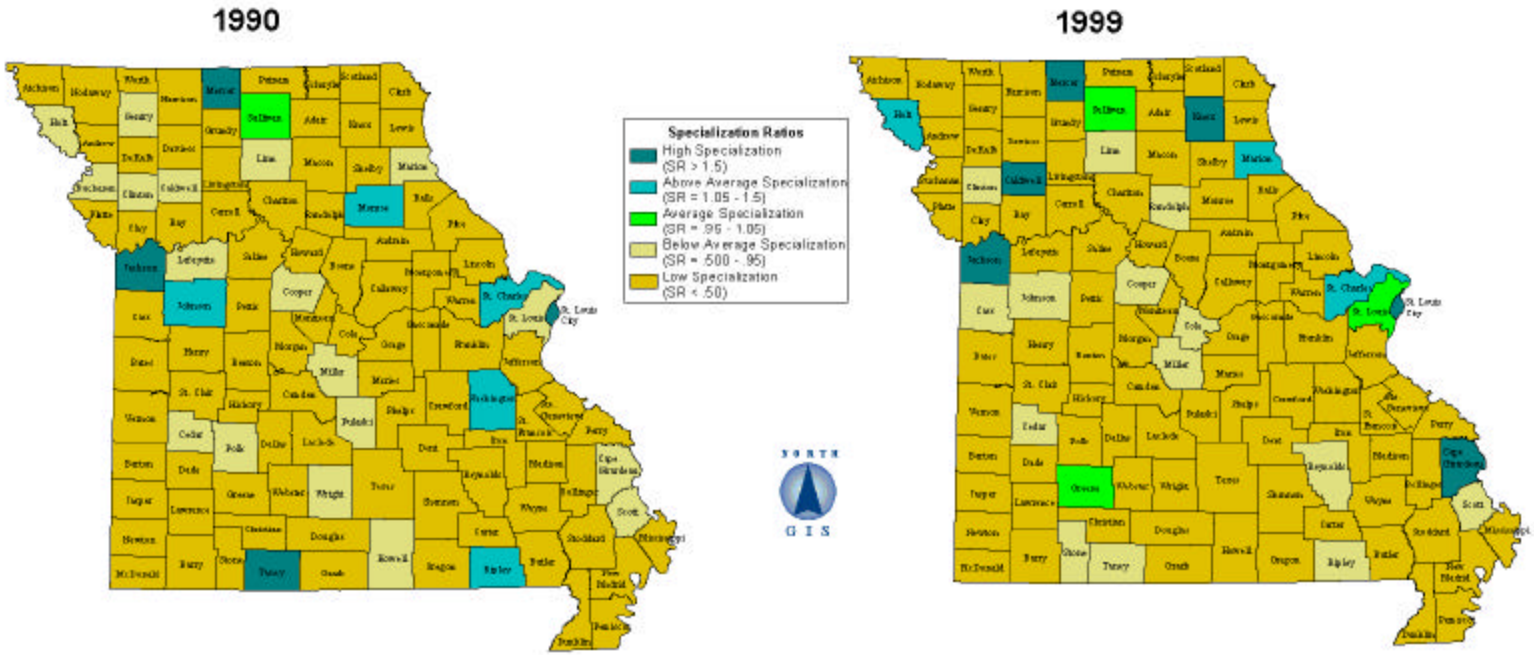
IT Telecommunication Services Subsector
Location of Firms



IT Telecommunication Services Subsector includes telephone communications; telegraph and other message communications; cable and other pay television stations; other communication servies.

Source: Dun and Bradstreet

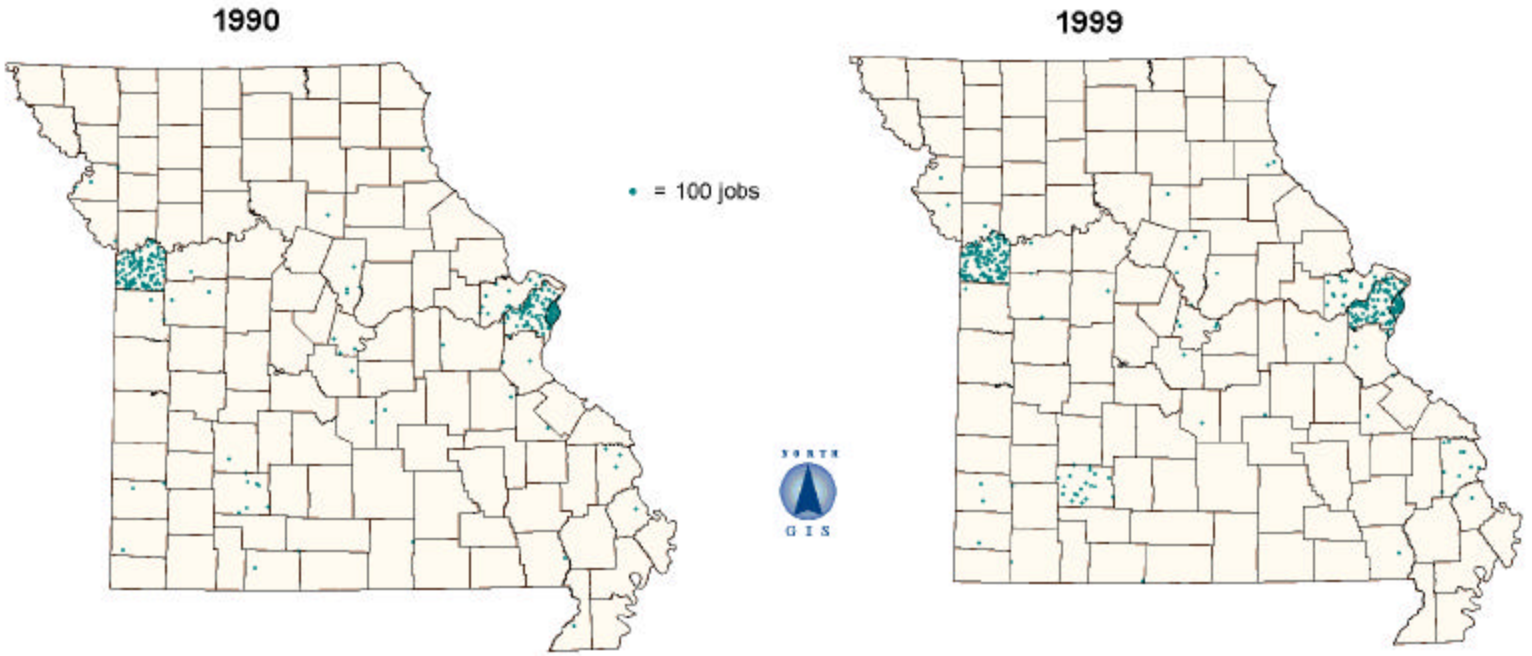
IT Telecommunication Services Subsector Employment Specialization Ratios



IT Telecommunication Services Subsector includes telephone communications; telegraph and other message communications; cable and other pay television stations; other communication services.

Source: ES-202, Missouri Department of Economic Development

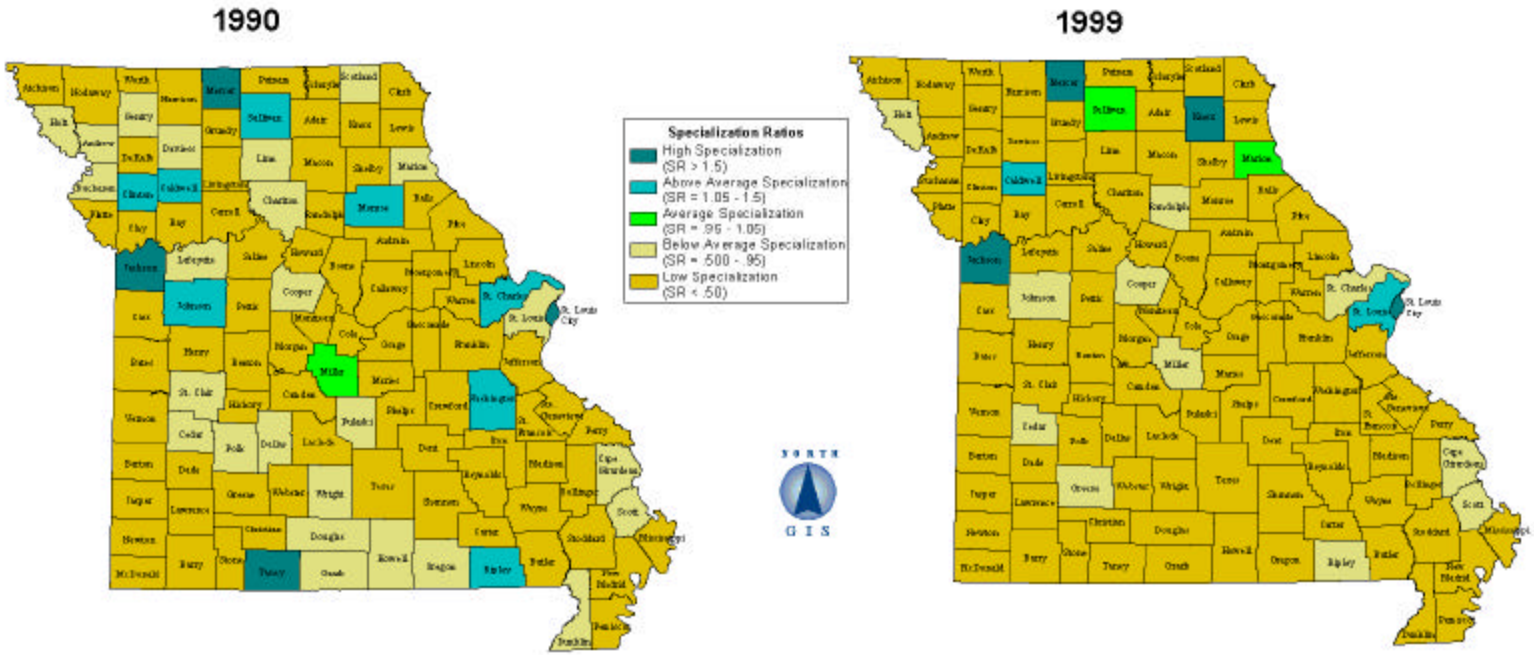
IT Telecommunication Services Subsector Employment



IT Telecommunication Services Subsector includes telephone communications; telegraph and other message communications; cable and other pay television stations; other communication services.

Source: ES-202, Missouri Department of Economic Development

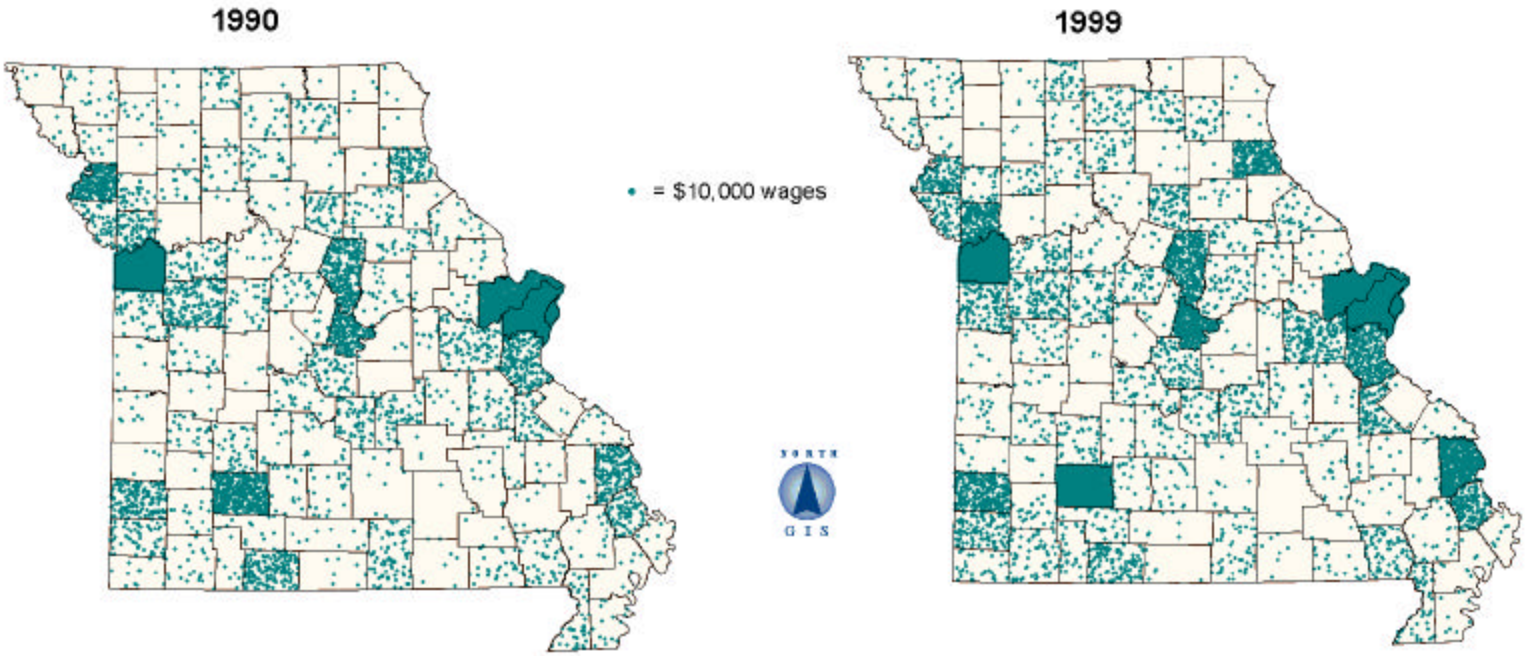
IT Telecommunication Services Subsector
Wage Specialization Ratios



IT Telecommunication Services Subsector includes telephone communications; telegraph and other message communications; cable and other pay television stations; other communication services.

Source: ES-202, Missouri Department of Economic Development

IT Telecommunication Services Subsector Wages



IT Telecommunication Services Subsector includes telephone communications; telegraph and other message communications; cable and other pay television stations; other communication services.

Source: ES-202, Missouri Department of Economic Development

The impact of new IT Telecommunication Services firms in the state is substantial. For instance, the creation of 100 jobs in the IT Telecommunication Services subsector would produce $5,232,151 in wages statewide, resulting in an average wage per job of $52,321. This direct impact would also create an additional 238 ancillary jobs and $3,423,549 in wages, for a total impact of 339 jobs and $11,315,415 in wages across Missouri. It is important to note that this model assumes that 100% of industry inputs (labor, materials, etc.) are purchased from Missouri firms. According to IMPLAN estimates, the IT Telecommunication Services subsector purchases only 56.8% of its inputs from firms within the state. Refer to Table 13.

Table 13
Employment Impacts of the
IT Telecommunication Services Subsector in Missouri, 1999
Per 100 Job Increase. Assumes 100% Local Impact.

SECTOR	Employment			
	Direct	Indirect	Induced	**TOTAL**
Telecommunication Services	100.0	9.3	0.9	**110.1**
Agriculture	0.0	1.0	2.7	**3.7**
Mining	0.0	0.1	0.1	**0.2**
Construction	0.0	9.6	1.7	**11.2**
Manufacturing	0.0	4.6	6.8	**11.5**
Transportation & Public Utilities	0.0	2.7	5.5	**8.2**
Retail/Wholesale Trade	0.0	8.5	42.5	**51.0**
Finance, Insur. & Real Estate	0.0	4.6	13.2	**17.8**
Services	0.0	56.2	58.6	**114.8**
Government	0.0	1.0	7.14	**8.1**
Other	0.0	0.0	2.6	**2.6**
TOTAL	**100.0**	**97.5**	**141.7**	**339.2**

Source: IMPLAN

Apart from the IT Telecommunication Services subsector, the Services (increase of 115 jobs and $2,600,390 in wages) and Retail/Wholesale Trade (increase of 51 jobs and $1,011,370 in wages) sectors would be most positively affected by the direct impact of 100 IT Telecommunications jobs. Although the indirect and induced employment effects are greatest in the Services sector, the average wage per job is quite low ($22,651) compared to the IT Telecommunication Services subsector ($51,840). This indicates that although the IT Telecommunication Services subsector creates fewer jobs, the average wage of those jobs is high. Conversely, it appears that the Mining and Agriculture sectors would be least affected, each gaining less than 5 jobs each. Refer to Table 14.

Table 14
Payroll Impacts of the
IT Telecommunication Services Subsector in Missouri, 1999
Per 100 Job Increase. Assumes 100% Local Impact.

SECTOR	Payroll			
	Direct	Indirect	Induced	**TOTAL**
Telecommunication Services	5,232,151	484,257	44,514	**5,760,922**
Agriculture	0	3,085	8,219	**11,303**
Mining	0	2,336	3,554	**5,889**
Construction	0	264,519	45,827	**310,346**
Manufacturing	0	201,107	299,043	**500,150**
Transportation & Public Utilities	0	94,681	192,778	**287,459**
Retail/Wholesale Trade	0	168,094	843,276	**1,011,370**
Finance, Insur. & Real Estate	0	138,074	396,828	**534,901**
Services	0	1,272,659	1,327,731	**2,600,390**
Government	0	33,567	236,010	**269,577**
Other	0	0	23,109	**23,109**
TOTAL	**5,232,151**	**2,662**	**3,420,887**	**11,315,415**

Source: IMPLAN

Case Study: IT Telecommunications in Princeton, Missouri

Mercer County, in northern Missouri, was identified as having a large proportion of IT sector employment and wages relative to the state average, especially in the IT Telecommunication Services subsector. Three firms engaged in IT are located in the county, all located in Princeton. The community of Princeton has a population of 1,021, and is located 25 miles from Interstate 35 and 118 miles north of Kansas City in a very sparsely populated area (8.7 people per square mile).

	Mercer County		Missouri	
	Number	Change from 1990	Number	Change from 1990
Population 1999	3,956	6.0%	5,468,338	6.7%
Unemployment 1999	48	3.0%	95,949	3.4%
Per Capita Income 1999	$8,162	-20.6%	$25,150	41.7%

The largest IT employer in Mercer County is Grand River Mutual Telephone Corporation (GRM), located in Princeton Missouri. GRM, a telecommunications cooperative, provides telephone and internet service to portions of northern Missouri and southern Iowa. The company had annual sales of around $15 million in 1999. GRM has its corporate headquarters in Princeton, where it employs roughly 50 people. GRM is a member of the National Telephone Cooperative Association.

GRM is a cooperative founded by members of the community to provide telecommunications services to those members. GRM holds the view that the future of rural America is directly tied to the quality of its telecommunications capability. In an era of exploding technology, deregulation, and marketplace competition, GRM's goal is to ensure that residents in northern Missouri receive telecommunications services on a par with those available to urban residents, and at reasonable cost.

Largest Employers in the IT Sector in Mercer County, Missouri, 1999

Company	City	SIC Description	Employment
Grand River Mutual Telephone Corp	Princeton	Telephone communication, except radio	25 to 50
South Central Communication	Princeton	Telephone communication, except radio	25 to 50
BIZ KIDZ Intl	Princeton	NA	NA

Source: Dun and Bradstreet

IT Telecommunications is concentrated in Mercer County for two main reasons. First, the employment base is quite small, therefore the presence of three telecommunications firms employing over 100 people is a significant part of the labor force. Second, maintenance of telecommunications infrastructure (lines, cables, etc.) requires that work crews be nearby. Since many of these jobs require a highly skilled labor force rather than a highly educated one, Mercer County may have been able to develop this IT subsector without a large number of college graduates. However, growth in this type of subsector is limited by a small population (people usually need only two phone lines, at most) and slow economic/population growth (no new businesses and residents). It should also be noted that GRM is a cooperative owned by its members, who have a vested interest in keeping it in Mercer County.

IV. Implications and Summary

Information technology (IT) is a term often used by government and industry to describe a series of processes, products and services related to computers, software, telecommunications and the Internet. The value of IT lies in its capacity to store, analyze and communicate information instantly, anywhere, at negligible cost. IT forms the core of the new economy; and is revolutionizing the way we communicate, work, shop and play. Based on these definitions, IT sectors in Missouri were identified and analyzed.

In general, IT employment and wages are concentrated in the metropolitan areas of the state. However, IT is not an entirely urban characteristic in that there are several pockets of IT commerce occurring in rural Missouri that exceed the state average. For example, Monett in Barry County specializes in software development; Hurdland in Knox County specializes in telecommunications infrastructure; and Bolivar in Polk County specializes in software and telecommunications development. These cities are located near regional metropolitan areas, and are in close proximity to major highways. Rural IT firms were usually founded by individuals from that area; and usually specialize in an area related to the rural economy (i.e. veterinary services).

Information Technology employment and wages are concentrated in the core metropolitan areas of St. Louis and Kansas City; and in the rural areas of Barry, Knox, and Polk counties. However, in nominal terms employment and wages are concentrated in St. Louis, Kansas City, Columbia/Jefferson City, Springfield, Cape Girardeau, Barry County, Polk County, Joplin, and Hannibal.

In 1999, the IT sector directly accounted for 4.54% of total GSP in Missouri ($6.93 billion). Indirect and induced economic effects attributable to the IT sector accounted for 3.68% of GSP ($5.63 billion). Taken together, the IT sector directly and indirectly accounted for 8.23% of total GSP in Missouri ($12.57 billion).

In 1999, there were 63,820 IT sector jobs in Missouri. This direct employment created an additional 121,188 ancillary jobs in the Missouri economy – for a total impact of 185,008 jobs statewide. IT is definitely a sector worth targeting, since the economic impacts are quite large. For example, the creation of 100 jobs in the IT sector would produce $5,066,327 in wages statewide, resulting in an average wage per job of $50,663. This direct impact would also create an additional 190 ancillary jobs and $4,896,179 in wages, for a total impact of 290 jobs and $9,962,506 in wages across Missouri.

IT Software employment is concentrated in St. Louis County, Jefferson City, Lincoln County, and Wayne County (Piedmont); and to a lesser degree in Springfield. However, in nominal terms employment is concentrated in the larger metro areas of the state – St. Louis, Kansas City, Springfield, and Jefferson City. IT Software wages also follow this pattern, with nominal wages concentrated in St. Louis, Kansas City, Springfield, and Columbia/Jefferson City.

The creation of 100 jobs in the IT Software subsector would produce $4,879,111 in wages statewide, resulting in an average wage per job of $48,791. This direct impact would also create an additional 142 ancillary jobs and $3,642,472 in wages, for a total impact of 242 jobs and $8,521,583 in wages across Missouri.

IT Services employment is concentrated in St. Louis County, northern Kansas City, Barry County (Monett), Maries County , and Polk County; and to a lesser degree in Kansas City and Bowling Green. However, in nominal terms employment is concentrated in the core metro areas of the state – St. Louis and Kansas City – as well as in Barry County. IT Services wages also follow this pattern, with nominal wages concentrated in St. Louis, Kansas City, Barry County, Columbia/Jefferson City, and Springfield.

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IT Telecommunication Services employment is concentrated in St. Louis City, Kansas City, Cape Girardeau, Princeton, Cameron, and Knox County; and to a lesser degree in St. Charles and Hannibal. However, in nominal terms employment is concentrated in the large metro areas of the state – St. Louis, Kansas City, and Springfield. IT Telecommunication Services wages also follow this pattern, with nominal wages concentrated in St. Louis, Kansas City, Springfield, Columbia/Jefferson City, Cape Girardeau, and Joplin.

The creation of 100 jobs in the IT Telecommunication Services subsector would produce $5,232,151 in wages statewide, resulting in an average wage per job of $52,321. This direct impact would also create an additional 237 ancillary jobs and $3,423,549 in wages, for a total impact of 339 jobs and $11,315,415 in wages across Missouri.

It appears that the IT Telecommunication Services subsector generates the greatest economic impact on the state economy, relative to other IT subsectors. It creates a larger number of ancillary jobs in the economy, and the highest average wages per job. This finding is especially significant for rural communities, since the subsector contains a large number of telecommunications firms which provide telephone access. Maintenance of this infrastructure requires work crews to be close at hand, thereby comprising a significant portion of the rural workforce. Since many of these jobs require a highly skilled labor force rather than a highly educated one, rural communities may be able to develop their IT sector without a large number of college graduates. However, growth in this type of subsector is limited by population (people usually need only two phone lines, at most) and economic/population growth (new business and residents).

In general, the IT sector creates fewer numbers of jobs than other economic sectors, but the average wage per job is very high – making it attractive to many communities. However, one limitation of this report is that it does not assess an area's capacity to attract IT firms. These firms usually require a labor force highly educated in science and technology – which are in short supply in many rural areas. It may not be feasible for a community with low educational attainment to recruit IT firms. Also, given the national shortage of these skills, Missouri will be competing with high-tech locations across the country to retain and attract educated workers.

However, two trends may help Missouri in developing its IT sector[5]. First, recent trends suggest that IT firms prefer to locate to areas of high natural amenities and high quality of life – characteristics that many Missouri communities possess. Unlike companies in other sectors, IT firms are not geographically bound and can locate virtually anywhere without significantly affecting operations. Second, highly educated professionals in the IT industry are retiring and locating to rural areas – usually to high natural and recreational amenity areas. Many of these retirees are starting new IT consulting firms to supplement their income. In fact, many are retiring early from their corporate careers, preferring the slower pace of consulting which leaves more recreational time. This influx of educated and experienced retired professionals may provide the basis for an emerging IT sector in rural America.

[5] Beale and Johnson. 1998. "The Identification of Recreational Counties in Nonmetropolitan Areas in the USA." *Population Research and Policy Review* 17: 37-53.

V. Appendix

Information Technology SICs

SIC	Description
	IT Software
7371	Computer Programming Services
7372	Prepackaged Software
	IT Services
7373	Computer Integrated Systems Design
7374	Computer Processing and Data Preparation and Processing Services
7375	Information Retrieval Services
7376	Computer Facilities Management Services
7377	Computer Rental and Leasing
7378	Computer Maintenance and Repair
7379	Computer Related Services, Not Elsewhere Classified
	IT Telecommunication Services
481	Telephone Communications
482	Telegraph and Other Message Communications
484	Cable and Other Pay Television Stations
489	Communications Services, Not Elsewhere Classified

From Stough et al. 1998. *Technology in Virginia's Regions*. Center for Innovative Technology.

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